

TABLES

TABLE I2-1: SOLID WASTE MANAGEMENT UNITS INTEGRATED WITH THE CERCLA PROGRAM IN OPERABLE UNIT 2B (SITES 3, 4, 11, AND 21) AT ALAMEDA POINT

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Page 1 of 2

CERCLA Site	Identification	Navy Recommendation/ Closure Status	Refer to Figure for Sample Results
3	NAS GAP 10	NFA Recommended	Figure I3-2
3	UST 97-A	Further Action Recommended	NA
3	UST 97-B	Further Action Recommended	NA
3	UST 97-C	Further Action Recommended	NA
3	UST 97-D	Further Action Recommended	NA
3	UST 97-E	Further Action Recommended	NA
4	AOC 372/SWMU 372	Further Action Recommended	Figure I3-4 & I3-5
4	AST 360A	Further Action Recommended	Figure I3-3
4	AST 360B	Further Action Recommended	Figure I3-3
4	AST 360C	Further Action Recommended	Figure I3-3
4	AST 360D	NFA Recommended	NA
4	AST 360E	Further Action Recommended	Figure I3-3
4	AST 372	Further Action Recommended	Figure I3-4 & I3-5
4	M-06	NFA Recommended	NA
4	NADEP GAP 01	NFA Recommended	NA
4	NADEP GAP 49A	NFA Recommended	NA
4	NADEP GAP 50	NFA Recommended	NA
4	NADEP GAP 51	NFA Recommended	NA
4	NADEP GAP 52	NFA Recommended	NA
4	NADEP GAP 55	NFA Recommended	NA
4	NADEP GAP 56	NFA Recommended	NA
4	NADEP GAP 57A	NFA Recommended	Figure I3-3
4	NADEP GAP 58	NFA Recommended	NA
4	NADEP GAP 59	Further Action Recommended	Figure I3-3
4	NADEP GAP 61	NFA Recommended	NA
4	NADEP GAP 80	NFA Recommended	NA
4	OWS 163	Further Action Recommended	Figure I3-4 & I3-5
4	OWS 360	Further Action Recommended	Figure I3-3
4	OWS 372A	Further Action Recommended	Figure I3-4 & I3-5
4	OWS 372B	NFA Recommended	Figure I3-4 & I3-5
11	AST 014A	NFA Recommended	NA
11	AST 014B	NFA Recommended	NA
11	AST 014C	NFA Recommended	NA

TABLE I2-1: SOLID WASTE MANAGEMENT UNITS INTEGRATED WITH THE CERCLA PROGRAM IN OPERABLE UNIT 2B (SITES 3, 4, 11, AND 21) AT ALAMEDA POINT

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Page 2 of 2

CERCLA Site	Identification	Navy Recommendation/ Closure Status	Refer to Figure for Sample Results
11	AST 014D	NFA Recommended	NA
11	NADEP GAP 47	NFA Recommended	NA
11	NADEP GAP 48	NFA Recommended	NA
11	OWS 014A	Further Action Recommended	Figure I3-6
11	OWS 014B	NFA Recommended	Figure I3-6
11	OWS 014C	NFA Recommended	Figure I3-6
11	OWS 014D	Further Action Recommended	Figure I3-6
11	OWS 014E	NFA Recommended	Figure I3-6
11	UST(R)-06	Further Action Recommended	NA
21	AOC 398	Further Action Recommended	Figure I3-7
21	M-07	NFA Recommended	NA
21	NADEP GAP 44	Further Action Recommended	Figure I3-7
21	NADEP GAP 45	NFA Recommended	NA
21	NADEP GAP 46	NFA Recommended	NA
21	NADEP GAP 76	NFA Recommended	NA
21	NADEP GAP 77	NFA Recommended	NA
21	NAS GAP 11	NFA Recommended	Figure I3-7
21	OWS 162	NFA Recommended	Figure I3-7
21	SWMU 162	NFA Recommended	NA

Notes:

AOC	Area of concern
AST	Aboveground storage tank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
GAP	Generation accumulation point
NA	Not applicable
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NFA	No further action
OWS	Oil-water separator
(R)	RCRA
RCRA	Resource Conservation and Recovery Act
SWMU	Solid waste management unit
UST	Underground storage tank
WD	Washdown

TABLE I2-2: SOLID WASTE MANAGEMENT UNITS INTEGRATED WITH THE TOTAL PETROLEUM HYDROCARBON PROGRAM IN OPERABLE UNIT 2B (SITES 3, 4, 11, AND 21) AT ALAMEDA POINT

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Page 1 of 1

CERCLA Site	Identification	Material Stored/Disposed	Navy Recommendation/ Closure Status
4	UST 163-1	Fuel Oil	NFA Recommended
11	AST 037A	Combustible petroleum waste	Further Action Recommended
11	AST 037B	Combustible petroleum waste	Further Action Recommended
11	AST 037C	Combustible petroleum waste	Further Action Recommended
11	AST 037D	Combustible petroleum waste	Further Action Recommended
21	AST 113	Diesel	NFA Recommended
21	UST(R)-09	Diesel Fuel	NFA Recommended

Notes:

ASTs and USTs containing petroleum are being addressed by RWQCB.

AOC	Area of concern
AST	Aboveground storage tank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
GAP	Generation accumulation point
NA	Not applicable
NAS	Naval Air Station
NFA	No further action
OWS	Oil-water separator
(R)	RCRA
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SWMU	Solid waste management unit
UST	Underground storage tank

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 1 of 65

SWMU Identifier **NAS GAP 10** **Refer to Figure #** Figure I3-2

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 3

EBS Subparcel 122

TPH CAA NA

Associated Building 112 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Preservation - Packaging

Additional Information Occupied a 25- by 30-foot area outside the northeast corner of Building 112; included 3 metal sheds with secondary containment on concrete; approximate location shown on figure

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Materials stored in 55-gallon drums and in doubled bags (capacity unknown)

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Solvents, lubrication and hydraulic oils, and asbestos (doubled bags)

Source of Initial SWMU Identification

SWMU # in RFA GII-08

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 Yes

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994); EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 2 of 65

Data Analysis

NAS GAP 10 consisted of metal sheds with automatic fire extinguishers and secondary containment, located northeast of Building 112. The RFA identified the location of the GAP, a 25-foot by 30-foot unit, on a figure and indicated a low potential for releases into soil and groundwater because the unit was self-contained atop a concrete floor (DTSC 1992). The area was evaluated during the EBS Phase I investigation. Based on available information, the actual location of the site could not be determined during the EBS; thus, no further sampling was required (ERM-West 1994). A letter from DTSC dated November 4, 1999, recommended NFA for this SWMU (DTSC 1999). A brief description of NAS GAP 10 was included in the EBS, Zone 17, Parcel 122, evaluation data summary report (IT 2001). Results from the nearest shallow groundwater sample collected during a UST investigation and a nearby EBS surface soil sample were reviewed. The groundwater sample was analyzed for VOCs and SVOCs; the soil sample was analyzed for pesticides and herbicides. Although analyzed (and not detected), pesticides and herbicides in soil were not evaluated in this assessment based on the types of material managed at the GAP. As depicted on the figure for Site 3, no VOCs or SVOCs were detected in groundwater. NAS GAP 10 was not listed as a likely source of soil and groundwater contamination at Site 3 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NAS GAP 10.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 3 of 65

SWMU Identifier **UST 97-A** Refer to Figure # **NA**

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel **EDC 10**

CERCLA Site **3**

EBS Subparcel **131**

TPH CAA **TPH CAA-03C**

Associated Building **NA**

Building Status **NA**

Leasing Status **NA**

Building Name **NA**

Additional Information **UST 97A; concrete tank destroyed in 1987; best-known location**

Operational Information for SWMU

Type of Unit **Underground Storage Tank(s)**

Capacity (gallons) **100,000**

Period of Operation **Unknown**

Material Managed at SWMU **115/145 AVGAS**

Source of Initial SWMU Identification

SWMU # in RFA **Not identified in RFA** Recommendation in RFA **NA**

Recommendation for NFA from DTSC in 1999 **NA**

SWMU Identified in Other Sources **UST Summary Report (Tetra Tech 2003)**

Tank-Related Information

Status of Tank **Removed**

Status of Associated Aboveground Pipes **NA**

Data Analysis

USTs 97-A through 97-E and associated fuel lines (fuel delivery system) were identified as likely sources of soil and groundwater contamination in the southern area of CERCLA Site 3. No data are shown on a figure because associated groundwater issues are being addressed on an OU-wide basis. VOCs (detected at elevated concentrations) appear to have been released to soil in the vicinity of the refueling facilities and USTs. AVGAS and VOCs are present in a commingled groundwater plume. Benzene, a primary COC in groundwater, is related to petroleum hydrocarbons; USTs 97-A through 97-E are identified as likely sources in the RI. Further action is recommended for USTs 97-A through UST 97-E. Soil at Site 3 and the OU-wide groundwater plume are recommended for further evaluation in feasibility studies under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 4 of 65

SWMU Identifier	UST 97-B	Refer to Figure #	NA
Navy Recommendation/Closure Status	Further Action Recommended		

Location Description

Disposal Parcel	EDC 10	CERCLA Site	3
EBS Subparcel	131	TPH CAA	TPH CAA-03C
Associated Building	NA	Building Status	NA
		Leasing Status	NA
Building Name	NA		
Additional Information	UST 97B; concrete tank destroyed in 1987; best-known location		

Operational Information for SWMU

Type of Unit	Underground Storage Tank(s)
Capacity (gallons)	100,000
Period of Operation	Unknown
Material Managed at SWMU	115/145 AVGAS

Source of Initial SWMU Identification

SWMU # in RFA	Not identified in RFA	Recommendation in RFA	NA
Recommendation for NFA from DTSC in 1999	NA		
SWMU Identified in Other Sources	UST Summary Report (Tetra Tech 2003)		

Tank-Related Information

Status of Tank	Removed	Status of Associated Aboveground Pipes	NA
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Data Analysis

Refer to UST 97-A.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 5 of 65

SWMU Identifier **UST 97-C** **Refer to Figure #** NA
Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10 **CERCLA Site** 3
EBS Subparcel 131 **TPH CAA** TPH CAA-03C
Associated Building NA **Building Status** NA **Leasing Status** NA
Building Name NA
Additional Information UST 97C; concrete tank destroyed in 1987; best-known location

Operational Information for SWMU

Type of Unit Underground Storage Tank(s)
Capacity (gallons) 100,000
Period of Operation Unknown
Material Managed at SWMU 115/145 AVGAS

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA
Recommendation for NFA from DTSC in 1999 NA
SWMU Identified in Other Sources UST Summary Report (Tetra Tech 2003)

Tank-Related Information

Status of Tank Removed **Status of Associated Aboveground Pipes** NA

Data Analysis

Refer to UST 97-A.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 6 of 65

SWMU Identifier	UST 97-D	Refer to Figure #	NA
Navy Recommendation/Closure Status	Further Action Recommended		

Location Description

Disposal Parcel	EDC 10	CERCLA Site	3
EBS Subparcel	131	TPH CAA	TPH CAA-03C
Associated Building	NA	Building Status	NA
		Leasing Status	NA
Building Name	NA		
Additional Information	UST 97D; concrete tank destroyed in 1987; best-known location		

Operational Information for SWMU

Type of Unit	Underground Storage Tank(s)
Capacity (gallons)	100,000
Period of Operation	Unknown
Material Managed at SWMU	115/145 AVGAS

Source of Initial SWMU Identification

SWMU # in RFA	Not identified in RFA	Recommendation in RFA	NA
Recommendation for NFA from DTSC in 1999	NA		
SWMU Identified in Other Sources	UST Summary Report (Tetra Tech 2003)		

Tank-Related Information

Status of Tank	Removed	Status of Associated Aboveground Pipes	NA
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Data Analysis

Refer to UST 97-A.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 7 of 65

SWMU Identifier **UST 97-E** **Refer to Figure #** NA
Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10 **CERCLA Site** 3
EBS Subparcel 131 **TPH CAA** TPH CAA-03C
Associated Building NA **Building Status** NA **Leasing Status** NA
Building Name NA
Additional Information UST 97E; steel tank destroyed in 1987; best-known location

Operational Information for SWMU

Type of Unit Underground Storage Tank(s)
Capacity (gallons) 100,000
Period of Operation Unknown
Material Managed at SWMU 115/145 AVGAS

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA
Recommendation for NFA from DTSC in 1999 NA
SWMU Identified in Other Sources UST Summary Report (Tetra Tech 2003)

Tank-Related Information

Status of Tank Removed **Status of Associated Aboveground Pipes** NA

Data Analysis

Refer to UST 97-A.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 8 of 65

SWMU Identifier **AOC 372/SWMU 372** Refer to Figure # Figure I3-4 & I3-5

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 134A

TPH CAA TPH CAA-04B

Associated Building 372 Building Status Present Leasing Status Not leased by ARRA

Building Name Turbo Prop Test Cell

Additional Information JP-5 fuel spill (SWMU 372). West of Building 372; received overflow from UST (AOC 372 = UST 372-1 & UST 372-2 - steel tanks); best-known locations shown on figure

Operational Information for SWMU

Type of Unit Underground Storage Tank(s) and Associated Spill Area

Capacity (gallons) 6,000 gal (UST 372-1) and 1,000 gal (UST-372-2)

Period of Operation Unknown

Material Managed at SWMU JP-5 (UST 372-1) and lubricating and waste oils (UST 372-2)

Source of Initial SWMU Identification

SWMU # in RFA AOC

Recommendation in RFA RFI Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank Removed

Status of Associated Aboveground Pipes NA

Data Analysis

AOC 372/SWMU 372 is located within CAA 4B and CERCLA Site 4. AOC 372 consists of the former UST 372-1, which stored up to 6,000 gallons of JP-5, and the former UST 372-2, which stored up to 1,000 gallons of lubricating and waste oil. Both USTs were removed along with 2,000 gallons of free product (JP-5). At the time of removal, UST 372-1 was observed to be in good condition, and UST 372-2 showed no visible defects (Tetra Tech 2003b). The free product release area is SWMU 372. SWMU 372 is documented as a JP-5 fuel spill at Test Cells 13 and 14 in Building 372. The spill occurred when UST 372-1 overfilled (IT 2001). UST 372-1 was identified as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). Further action is recommended for AOC 372/SWMU 372. Hit boxes are presented for selected sampling locations with elevated results. Groundwater is contaminated with TPH (including BTEX) and chlorinated hydrocarbons (commingled). With the commingled plume, the SWMU, both former UST locations, and the associated AOC will be evaluated and closed under the CERCLA program. The OU-wide groundwater plume is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 9 of 65

SWMU Identifier **AST 360A** Refer to Figure # Figure I3-3

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 Building Status Present Leasing Status Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Building 360 - 1 of 3 ASTs on northern side; best-known location shown on figure

Operational Information for SWMU

Type of Unit Aboveground Storage Tank(s)

Capacity (gallons) 2,500

Period of Operation Unknown

Material Managed at SWMU Diesel

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA Recommendation in RFA NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank Present in good condition located within an approximate 3-foot-deep concrete berm (excavated into the ground), which is currently filled with water; not in use

Status of Associated Aboveground Pipes Partially disconnected; most pipes are disconnected, but piping leading into Building 360 remains intact

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 10 of 65

Data Analysis

AST 360A is located outside, adjacent to the north end of Building 360. A concrete basin provides secondary containment for this tank as well as two other adjacent ASTs (360B and 360C). The AST cluster is located within Zone 22, Parcel 143; however, it was not targeted for sampling during the EBS because the ASTs are part of CERCLA Site 4 (IT 2001). A CERCLA-related groundwater sample was collected nearby and analyzed for VOCs. No discrete soil data are available within 100 feet of the ASTs. As depicted on the Site 4 (North) figure, VOCs were not detected; however, this sampling location falls within larger elevated benzene and chlorinated VOC plumes. The AST cluster was listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). Other likely sources in and around Building 360 also exist. Further action is recommended for ASTs 360A, 360B, and 360C. The OU-wide groundwater plume is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 11 of 65

SWMU Identifier **AST 360B** Refer to Figure # **Figure I3-3**

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel **EDC 10**

CERCLA Site **4**

EBS Subparcel **143**

TPH CAA **NA**

Associated Building **360** Building Status **Present** Leasing Status **Not leased by ARRA**

Building Name **Aircraft Engine and Air Frame Overhaul Facility**

Additional Information **Building 360 - 2 of 3 ASTs on northern side; best-known location shown on figure**

Operational Information for SWMU

Type of Unit **Aboveground Storage Tank(s)**

Capacity (gallons) **2,500**

Period of Operation **Unknown**

Material Managed at SWMU **Diesel**

Source of Initial SWMU Identification

SWMU # in RFA **Not identified in RFA** Recommendation in RFA **NA**

Recommendation for NFA from DTSC in 1999 **NA**

SWMU Identified in Other Sources **EBS (IT 2001); TPH Data Gap Sampling Report (Tetra Tech 2001)**

Tank-Related Information

Status of Tank **Present in good condition located within an approximate 3-foot-deep concrete berm (excavated into the ground), which is currently filled with water; not in use**

Status of Associated Aboveground Pipes **Partially disconnected; most pipes are disconnected, but piping leading into Building 360 remains intact**

Data Analysis

Refer to AST 360A.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 12 of 65

SWMU Identifier **AST 360C**

Refer to Figure # Figure I3-3

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 Building Status Present Leasing Status Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Building 360 - 3 of 3 ASTs on northern side; best-known location shown on figure

Operational Information for SWMU

Type of Unit Aboveground Storage Tank(s)

Capacity (gallons) 2,500

Period of Operation Unknown

Material Managed at SWMU Diesel

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA Recommendation in RFA NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001); TPH Data Gap Sampling Report (Tetra Tech 2001)

Tank-Related Information

Status of Tank Present in good condition located within an approximate 3-foot-deep concrete berm (excavated into the ground), which is currently filled with water; not in use

Status of Associated Aboveground Pipes Partially disconnected; most pipes are disconnected, but piping leading into Building 360 remains intact

Data Analysis

Refer to AST 360A.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 13 of 65

SWMU Identifier **AST 360D** Refer to Figure # NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 Building Status Present Leasing Status Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Building 360 - western side; best-known location

Operational Information for SWMU

Type of Unit Aboveground Storage Tank(s)

Capacity (gallons) 3,000

Period of Operation Unknown

Material Managed at SWMU Compressed air or steam (thought to contain PD-680 [Stoddard Solvent] in error)

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA Recommendation in RFA NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources BRAC Cleanup Plan (1998)

Tank-Related Information

Status of Tank Present in good condition; not in use Status of Associated Aboveground Pipes Partially disconnected

Data Analysis

AST 360D is located outside, adjacent to the southwest side of Building 360. During a 2004 site visit, the tank construction and associated utility features were observed. Based on observations of pressure gauges, it was concluded that the tank most likely held steam or compressed air and not PD-680. There is no reason to suspect subsurface contamination from this tank. NFA is recommended for AST 360D.

Nondetect Review

NA

Site Visit(s)

July 2004 visit: Tank has two pressure gauges and either supplies compressed air or steam to Building 163. Piping leads from the tank underground into Building 163 (west of the tank) and several pipes lead into Building 360; only a few have visible separations from the tank.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 14 of 65

SWMU Identifier	AST 360E	Refer to Figure #	Figure I3-3
Navy Recommendation/Closure Status	Further Action Recommended		
<u>Location Description</u>			
Disposal Parcel	EDC 10	CERCLA Site	4
EBS Subparcel	143	TPH CAA	NA
Associated Building	360	Building Status	Present
		Leasing Status	Not leased by ARRA
Building Name	Aircraft Engine and Air Frame Overhaul Facility		
Additional Information	West of Bldg 360; best-known location shown on figure		
<u>Operational Information for SWMU</u>			
Type of Unit	Aboveground Storage Tank(s)		
Capacity (gallons)	3,000		
Period of Operation	Unknown		
Material Managed at SWMU	Paint and paint seal wastes		
<u>Source of Initial SWMU Identification</u>			
SWMU # in RFA	GI-24	Recommendation in RFA	NA
Recommendation for NFA from DTSC in 1999	NA		
SWMU Identified in Other Sources	NA		
<u>Tank-Related Information</u>			
Status of Tank	Present in fair condition (some corrosion is apparent) located in an approximate 1-foot-tall concrete berm, which slopes steeply to the bottom of the tank, not in use; tagged "out of service".	Status of Associated Aboveground Pipes	Disconnected; piping is present, but not currently attached to Building 360

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 15 of 65

Data Analysis

AST 360E is located at the northwest corner of the west wing of Building 360, within CERCLA Site 4. The unit is approximately 8 feet by 8 feet and is inactive. According to the RFA, a low potential for releases into soil and groundwater existed because the unit had secondary containment (DTSC 1992); however, a 2004 site visit indicated some cracks in the concrete, secondary-containment berm. Grab groundwater samples from multiple depths at one location were collected adjacent to the AST. Samples were analyzed for VOCs. The AST held paint and paint seal wastes; however, no metals results are available. As depicted on the figure for Site 4 (North), all analytes were either not detected (minimum reporting limits for all chemicals exceeded MCLs) or detected at concentrations above MCLs (California Department of Health Services 2003). No soil sample results are available within 50 feet of the AST. The groundwater results fall within a larger chlorinated VOC plume. AST 360E was identified as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). Other likely sources in and around Building 360 also exist. Further action is recommended for AST 360E. The OU-wide groundwater plume is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

July 2004 visit: Observed cracks in concrete in secondary containment

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 16 of 65

SWMU Identifier **AST 372**

Refer to Figure # Figure I3-4 & I3-5

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 134A

TPH CAA TPH CAA-04B

Associated Building 372 Building Status Present Leasing Status Not leased by ARRA

Building Name Turbo Prop Test Cell

Additional Information West of Building 372 (small secondary containment area); approximate location shown on figure

Operational Information for SWMU

Type of Unit Aboveground Storage Tank(s)

Capacity (gallons) Unknown

Period of Operation Unknown

Material Managed at SWMU Fuel or fuel oils

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA Recommendation in RFA NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994)

Tank-Related Information

Status of Tank Removed

Status of Associated Aboveground Pipes Unknown

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 17 of 65

Data Analysis

AST 372 was located west of Building 372; limited information is available. An unknown quantity of fuel or fuel oils was stored in the AST, which was located in a small secondary containment area. The AST was not identified in the RFA nor was it referenced in the EBS (IT 2001). Soil and groundwater samples were collected near the former AST location and analyzed for TPH, metals (groundwater only), VOCs, SVOCs (groundwater only), pesticide/PCBs (groundwater only), and PAHs (groundwater only). Although analyzed, metals, pesticide/PCBs, and PAHs in groundwater were not evaluated in this assessment based on the types of material managed at the AST. Hit boxes are presented for selected sampling locations with elevated results. As depicted on the figures for Site 4 (South), BTEX compounds in groundwater were detected at concentrations well above MCLs (California Department of Health Services 2003) at one location (372-5-ERM). Total TPH exceeded the groundwater PRC for aquatic receptors (Navy 2001) at two locations (372-5-ERM and 030-S19-011). Concentrations of TPH in groundwater suggest free product is present. BTEX compounds in soil were detected at concentrations above residential and industrial PRCs (Navy 2001) and EPA PRGs (EPA 2002) at one location (372-5-ERM). TPH-diesel in soil exceeded the residential PRC, but was less than the industrial PRC at this location. AST 372 was identified as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). Other SWMUs, including OWS 372A and AOC 372/SWMU 372, and fuel lines are located in the vicinity. Further action is recommended for AST 372. An OU-wide groundwater plume with commingled TPH and chlorinated hydrocarbons is present in the vicinity and is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

AST removed prior to 2002 site visit.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 18 of 65

SWMU Identifier **M-06** Refer to Figure # NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 Building Status Present Leasing Status Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Inside Building 360; portable solvent distillation unit; Cleaning and Blasting Shop

Operational Information for SWMU

Type of Unit Miscellaneous Sites

Capacity (gallons) 15

Period of Operation Unknown

Material Managed at SWMU PD-680, paint thinners, and acetone

Source of Initial SWMU Identification

SWMU # in RFA M-06

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

M-06 consisted of a portable 15-gallon solvent distillation unit. The unit was located in the Cleaning and Blasting Shop of Building 360. According to the RFA, no RFI was recommended for M-06 because the unit was located inside and on a concrete floor (DTSC 1992). A brief description of M-06 was included in the EBS, Zone 22, Parcel 143, evaluation data summary report (IT 2001). A 2002 site visit described a nearby expansion joint in the concrete floor, but no stains were apparent within the joint. M-06 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for M-06.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on the floor of Building 360, marking a hazardous waste containment area, is all that remains of M-06. The surrounding areas are vacant except for minor debris (paper trash, film spool, etc.). An expansion joint in the concrete is visible at the site, but no stains are apparent within the joint.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 19 of 65

SWMU Identifier **NADEP GAP 01** **Refer to Figure #** NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Inside Building 360; approximate location in Shop 96234

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Unknown

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Aluminum oxides

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 01 was not included in the RFA. According to the EBS (Parcel 143 of Zone 22), NADEP GAP 01 was located in Shop 96234 within Building 360 and stored aluminum oxides. The capacity of the former GAP was unknown (IT 2001). The Phase I EBS concluded that NADEP GAP 01 did not require further investigation because the site was paved and site inspectors did not observe staining (ERM-West 1994). A 2002 site visit confirmed EBS observations further documenting that the former GAP sat on a concrete floor with no staining, corrosion, or obvious pathway through the floor apparent in the vicinity. NADEP GAP 01 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 01.

Nondetect Review

NA

Site Visit(s)

2002 visit: Faded markings painted on the concrete inside of Building 360 are all that remains of NADEP GAP 01. Some machinery remains in the surrounding areas. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 20 of 65

SWMU Identifier **NADEP GAP 49A** Refer to Figure # NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 Building Status Present Leasing Status Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Inside Building 360; approximate location in Shop 96212

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Unknown

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Aluminum oxide with some ammonium chloride

Source of Initial SWMU Identification

SWMU # in RFA GI-20

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 49A consisted of storage drum(s) (the capacity is unknown) atop a wooden pallet. The area measured approximately 5 feet by 5 feet and was located inside of Building 360. According to the RFA, NADEP GAP 49A exhibited a low potential for releases into soil and groundwater because the site was located indoors on a concrete floor. An RFI was not required (DTSC 1992). A description of NADEP GAP 49A was included in the EBS, Zone 22, Parcel 143 evaluation data summary report (IT 2001). A 2002 site visit further documented that no staining, corrosion, or obvious pathway through the floor was apparent in the vicinity of the former GAP. NADEP GAP 49A was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 49A.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on the floor of Building 360, marking a hazardous waste containment area, is all that remains of NADEP GAP 49A. The surrounding area is vacant. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 21 of 65

SWMU Identifier **NADEP GAP 50** **Refer to Figure #** NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Inside Building 360; approximate location in Shop 96223 (Plating Shop)

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Unknown

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Blasting grit (glass) and chromic acid

Source of Initial SWMU Identification

SWMU # in RFA GI-21

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 50 consisted of storage drums (the capacity is unknown). The area measured approximately 10 feet by 5 feet and was located inside Building 360 in Shop 96223 (Plating Shop). According to the RFA, the walls and paved floor around NADEP GAP 50 were stained; no cracks were apparent on the floor. Additionally, the associated plating shop is a main focus of the CERCLA Site 4 evaluation (DTSC 1992). The Phase I EBS concluded that NADEP GAP 50 did not require further investigation because the site was paved (ERM-West 1994). A description of NADEP GAP 50 was included in the EBS, Zone 22, Parcel 143 evaluation data summary report (IT 2001). A 2002 site visit confirmed the minor staining on the wall behind the GAP; however, no stains, corrosion, or obvious pathway through the floor were present. NADEP GAP 50 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 50.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on the floor of Building 360, marking a hazardous waste containment area, is all that remains of NADEP GAP 50. The surrounding area is vacant. Minor stains are visible on the wall behind the site; however, no stains, corrosion, or obvious pathway through the floor is present.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 22 of 65

SWMU Identifier **NADEP GAP 51** Refer to Figure # **NA**

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel **EDC 10**

CERCLA Site **4**

EBS Subparcel **143**

TPH CAA **NA**

Associated Building **360** Building Status **Present** Leasing Status **Not leased by ARRA**

Building Name **Aircraft Engine and Air Frame Overhaul Facility**

Additional Information **Inside Building 360; approximate location in Shop 96225**

Operational Information for SWMU

Type of Unit **Generator Accumulation Point**

Capacity (gallons) **Aerosol cans, 55-gallon drums**

Period of Operation **GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.**

Material Managed at SWMU **Aerosol paint, epoxy paint, and thinner**

Source of Initial SWMU Identification

SWMU # in RFA **GI-22**

Recommendation in RFA **RFI Not Required**

Recommendation for NFA from DTSC in 1999 **NA**

SWMU Identified in Other Sources **EBS (IT 2001)**

Tank-Related Information

Status of Tank **NA**

Status of Associated Aboveground Pipes **NA**

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 23 of 65

Data Analysis

NADEP GAP 51 consisted of 55-gallon storage drums resting on wooden pallets atop a poly spill pallet, which acted as a secondary containment system. In addition, 55-gallon drums containing aerosol cans were placed on pallets without secondary containment. The area measured approximately 12 feet by 5 feet and was located inside Building 360 in Shop 96225. According to the RFA, NADEP GAP 51 exhibited a low potential for releases into the soil and groundwater because the site was located indoors on a concrete floor. An RFI was not required (DTSC 1992). The Phase I EBS concluded that NADEP GAP 51 did not require further investigation because the site was paved and site inspectors did not observe staining (ERM-West 1994). A description of NADEP GAP 51 was included in the EBS, Zone 22, Parcel 143 evaluation data summary report (IT 2001). The EBS incorrectly states that the site consisted of 5-gallon containers. A 2002 site visit noted some minor cracks on the floor; however, no stains, corrosion, or obvious pathway through the floor were present in the vicinity of the GAP. NADEP GAP 51 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 51.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on the floor of Building 360, marking a hazardous waste containment area, is all that remains of NADEP GAP 51. The surrounding area is vacant. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site. Minor cracks are present on the floor.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 24 of 65

SWMU Identifier **NADEP GAP 52** **Refer to Figure #** NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Building 360, Shop 96231; approximate location outside of Building 360 along western exterior wall on concrete

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Varied containers up to 55-gallon drums

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Aerosol paint and lubrication, lubrication and engine oils, JP-5, and PD-680

Source of Initial SWMU Identification

SWMU # in RFA GI-23

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 25 of 65

Data Analysis

NADEP GAP 52 consisted of 30- and 55-gallon storage drums (some containing aerosol cans). A poly safety pack acted as a secondary containment system for liquid waste. Solid waste was placed in storage drums atop pallets outside of the secondary containment. The area, located outside of Building 360, measured approximately 5 feet by 10 feet with no roof. According to the RFA, the area was stained by grease, but it appeared no leaks could penetrate the elevated (approximately 4 feet) concrete foundation. NADEP GAP 52 exhibited a low potential for releases into soil and groundwater because the unit was located on an elevated concrete foundation with secondary containment (DTSC 1992). The Phase I EBS concluded that NADEP GAP 52 did not require further investigation because the site was paved (ERM-West 1994). A description of NADEP GAP 52 was included in the EBS, Zone 22, Parcel 143 evaluation data summary report (IT 2001). No sampling was performed adjacent to the GAP site. A 2002 site visit confirmed RFA and EBS observations documenting that the former GAP sat on a concrete floor with staining, corrosion, and minor cracks apparent in the vicinity. NADEP GAP 52 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 52.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on a piece of elevated foundation outside of Building 360, marking a hazardous waste containment area, is all that remains of NADEP GAP 52. The surrounding area is vacant. Staining and corrosion are apparent at the former site. Minor cracks are present in the concrete.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 26 of 65

SWMU Identifier **NADEP GAP 55** **Refer to Figure #** NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Inside Building 360; approximate location in Shop 96215

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) 55-gallon drums, large bags

Period of Operation GAPS were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Blasting grit (glass, plastic) and aluminum oxide

Source of Initial SWMU Identification

SWMU # in RFA GI-25

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 55 consisted of large poly bags and 55-gallon storage drums atop wooden pallets. The area measured approximately 5 feet by 5 feet and was located inside Building 360 in Shop 96215. According to the RFA, NADEP GAP 55 exhibited a low potential for releases into soil and groundwater because the site was located indoors on a concrete floor. An RFI was not required (DTSC 1992). The Phase I EBS concluded that NADEP GAP 55 did not require further investigation because the site was paved and site inspectors did not observe staining (ERM-West 1994). A description of NADEP GAP 55 was included in the EBS, Zone 22, Parcel 143 evaluation data summary report. A 2002 site visit noted some small cracks on the floor; however, no stains, corrosion, or obvious pathway through the floor were present in the vicinity of the GAP. NADEP GAP 55 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 55.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on the floor of Building 360, marking a hazardous waste containment area, is all that remains of NADEP GAP 55. The surrounding area is vacant. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site. Small cracks present on the floor do not warrant further investigation.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 27 of 65

SWMU Identifier **NADEP GAP 56**

Refer to Figure # NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Inside Building 360; approximate location in Shop 96215

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) 55-gallon drums, large bags

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Blasting grit (glass, plastic) and aluminum oxide

Source of Initial SWMU Identification

SWMU # in RFA GI-26

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 56 consisted of large poly bags and 55-gallon storage drums atop wooden pallets. The bags were taped directly to and beneath hoppers located inside of Building 360. According to the RFA, NADEP GAP 56 exhibited a low potential for releases into soil and groundwater because the site was located indoors on a concrete floor. Additionally, no liquid wastes were stored at the GAP. An RFI was not required (DTSC 1992). The Phase I EBS concluded that NADEP GAP 56 did not require further investigation because the site was paved and site inspectors did not observe staining (ERM-West 1994). A description of NADEP GAP 56 was included in the EBS, Zone 22, Parcel 143, evaluation data summary report (IT 2001). A 2002 site visit confirmed EBS observations, documenting that no staining, corrosion, or obvious pathway through the floor was present in the vicinity of the GAP. NADEP GAP 56 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 56.

Nondetect Review

NA

Site Visit(s)

2002 visit: Two adjacent, faded, red and white rectangles painted on the floor of Building 360, marking hazardous waste containment areas, is all that remains of NADEP GAP 56. Hoppers are still present at the site. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 28 of 65

SWMU Identifier **NADEP GAP 57A** **Refer to Figure #** Figure I3-3

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10 **CERCLA Site** 4

EBS Subparcel 143 **TPH CAA** NA

Associated Building 360 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Building 360, Shop 96215; outside northern wall of Building 360; area 20 feet by 30 feet; 2 metal bins on concrete; approximate location shown on figure

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Two metal bins atop concrete

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Blasting grit (all media)

Source of Initial SWMU Identification

SWMU # in RFA GI-27 **Recommendation in RFA** RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA **Status of Associated Aboveground Pipes** NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 29 of 65

Data Analysis

NADEP GAP 57A consisted of metal bins located next to a storm sewer outside the north wall of Building 360. The bins held full poly bags of blasting grit. The GAP measured approximately 30 feet by 20 feet. According to the RFA, the storm sewer location may be a concern; however, no liquid waste was stored at the GAP, the bins were covered, the bags closed, and waste leaching through the bins was thought improbable. The RFA concluded NADEP GAP 57A exhibited a low potential for releases into the soil and groundwater because the site stored nonliquid hazardous waste inside metal covered bins placed on concrete (DTSC 1992). A description of NADEP GAP 57A was included in the EBS, Zone 22, Parcel 143 evaluation data summary report (IT 2001). A 2002 site visit confirmed EBS observations further documenting that the former GAP sat on a concrete floor with no staining, corrosion, or obvious pathway through the floor apparent in the vicinity. One subsurface soil sample was collected and analyzed for TPH, metals, VOCs, SVOCs, PAHs, PCBs, herbicides, and organotins. Although analyzed, TPH, VOCs, SVOCs, PAHs, PCBs, and herbicides were not evaluated in this assessment based on the type of material managed at the SWMU. As depicted on the figure for Site 4 (North), metals were either not detected or detected at concentrations below residential EPA PRGs (EPA 2002). Organotins were not detected. NADEP GAP 57A was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 57A.

Nondetect Review

Nondetect values were compared to 2004 Region 9 residential PRGs and Cal-modified PRGs, when available. All nondetect values for metals in soil less than PRGs. All nondetect values for organotins in soil less than PRGs.

Site Visit(s)

2002 visit: A faded red and white rectangle marking the former location of a hopper is all that remains of NADEP GAP 57A. The hopper was located in a corner of the site near metal bins. The area is currently vacant. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former GAP.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 30 of 65

SWMU Identifier **NADEP GAP 58** **Refer to Figure #** NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 143

TPH CAA NA

Associated Building 360 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Aircraft Engine and Air Frame Overhaul Facility

Additional Information Inside Building 360; approximate location in Shop 96211

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Aerosol cans, 55-gallon drums

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Aerosol cans (Turco Dy-check developer and remover) and rags

Source of Initial SWMU Identification

SWMU # in RFA GI-28

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 58 consisted of 55-gallon storage drums, containing aerosol cans and rags, resting on wooden pallets. The area measured approximately 5 feet by 5 feet and was located inside Building 360 in Shop 96211. According to the RFA, NADEP GAP 58 exhibited a low potential for releases into soil and groundwater because the site stored nonliquid hazardous waste indoors on a concrete floor. An RFI was not required (DTSC 1992). The Phase I EBS concluded that NADEP GAP 58 did not require further investigation because the site was paved and site inspectors did not observe staining (ERM-West 1994). A description of NADEP GAP 58 was included in the EBS, Zone 22, Parcel 143 evaluation data summary report (IT 2001). A 2002 site visit noted some minor cracks on the floor; however, no stains, corrosion, or obvious pathway through the floor were present in the vicinity of the GAP. NADEP GAP 58 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 58.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on the floor of Building 360, marking a hazardous waste containment area, is all that remains of NADEP GAP 58. The surrounding areas are vacant. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site. Minor cracks are present on the floor, but do not warrant further investigation.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 31 of 65

SWMU Identifier **NADEP GAP 59** **Refer to Figure #** Figure I3-3

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 134A

TPH CAA TPH CAA-04A

Associated Building 163A **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Equipment Maintenance (Plant Service A/C)

Additional Information Building 163A, Shop 65132; outside, between Buildings 163A and 414; area 8 feet by 8 feet on asphalt; approximate location shown on figure

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) 55-gallon & 30-gallon drums

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Petroleum oil and lubrication oil

Source of Initial SWMU Identification

SWMU # in RFA GI-43

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 32 of 65

Data Analysis

NADEP GAP 59 consisted of 30- and 55-gallon storage drums (containing liquid waste) placed within a poly safety pack, which acted as a secondary containment system. The area measured approximately 8 feet by 8 feet and was located outside of Building 163A, adjacent to a product storage area. According to the RFA, NADEP GAP 59 exhibited a low potential for releases into the soil and groundwater because the site had secondary containment and was located on flat asphalt pavement (DTSC 1992). NADEP GAP 59 was investigated as Phase 2A, Target Area 5 in the EBS, Zone 22, Parcel 134 evaluation data summary report (IT 2001). Three surface soil samples were collected nearby and analyzed for TPH. As depicted on the figure for Site 4 (North), TPH-diesel and gasoline were not detected or detected at concentrations below available residential PRCs (Navy 2001). At two sampling locations, however, TPH-motor oil concentrations exceeded both residential and nonresidential PRCs in surface soils. Additional sampling of soil and groundwater (Phase 2B) was recommended to determine the nature and extent of detected petroleum products in the area; however, no sampling locations were located near NADEP GAP 59. NADEP GAP 59 was listed as a likely source of TPH surface soil contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). A data gap exists for near-surface soil and groundwater results. Further action is recommended for NADEP GAP 59.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on the asphalt pavement outside of Building 163 is all that remains of NADEP GAP 59. The current tenant of Building 163 stated that the area appeared clean before his use. The area is bounded by a fence and is used for vehicle maintenance and machinery storage.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 33 of 65

SWMU Identifier **NADEP GAP 61** **Refer to Figure #** NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 134A

TPH CAA NA

Associated Building 372 **Building Status** Present **Leasing Status** Not leased by ARRA

Building Name Turbo Prop Test Cell

Additional Information Inside Building 372, approximate location in Shop 96232

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) 55-gallon drums

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU JP-5 with engine oil, shop rags with oil, lubrication and engine oil with JP-5, PD-680, spent sweeping compounds

Source of Initial SWMU Identification

SWMU # in RFA GI-44

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 Yes

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 61 consisted of 55-gallon storage drums resting on wooden pallets atop a poly spill pallet, which acted as a secondary containment system. Other 55-gallon drums were placed on pallets without secondary containment. The area measured approximately 8 feet by 8 feet and was located inside of Building 372. According to the RFA, NADEP GAP 61 exhibited a low potential for releases into soil and groundwater because the site was located indoors on a concrete floor. An RFI was not required (DTSC 1992). Because no staining was observed during the Phase I EBS site inspection (ERM-West 1994), no further investigation was required. A letter from DTSC dated November 4, 1999, recommended NFA for this SWMU (DTSC 1999). A description of NADEP GAP 61 was included in the EBS, Zone 22, Parcel 134, evaluation data summary report (IT 2001). NADEP GAP 61 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 61.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 34 of 65

SWMU Identifier **NADEP GAP 80** Refer to Figure # **NA**

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel **EDC 10**

CERCLA Site 4

EBS Subparcel **143**

TPH CAA NA

Associated Building **360** Building Status **Present** Leasing Status **Not leased by ARRA**

Building Name **Aircraft Engine and Air Frame Overhaul Facility**

Additional Information **Inside Building 360, Shop 96223 (Plating Shop); approximate location shown on figure**

Operational Information for SWMU

Type of Unit **Generator Accumulation Point**

Capacity (gallons) **Unknown**

Period of Operation **GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.**

Material Managed at SWMU **Cyanide**

Source of Initial SWMU Identification

SWMU # in RFA **Not identified in RFA** Recommendation in RFA **NA**

Recommendation for NFA from DTSC in 1999 **NA**

SWMU Identified in Other Sources **EBS (IT 2001)**

Tank-Related Information

Status of Tank **NA**

Status of Associated Aboveground Pipes **NA**

Data Analysis

NADEP GAP 80 was not included in the RFA. According to the Phase I EBS, NADEP GAP 80 was located in Shop 96223 (Plating Shop) within Building 360. The capacity of the former GAP was unknown. The Phase I EBS documented one known release at this site. Approximately 180 gallons of cyanide were released into a sump in the plating shop in October 1987. The Phase I EBS concluded that NADEP GAP 80 did not require further sampling because the GAP was on a concrete floor inside the building and site inspectors did not observe staining (ERM-West 1994). A description of NADEP GAP 80 was included in the EBS, Zone 22, Parcel 143 evaluation data summary report (IT 2001). A 2002 site visit confirmed EBS observations documenting that the former GAP was located on a concrete floor with no staining, corrosion, or obvious pathway through the floor apparent in the vicinity of the former GAP. NADEP GAP 80 was not listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 80.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on concrete inside Building 360, marking a hazardous waste containment area, is all that remains of NADEP GAP 80. Some machinery remains in the surrounding areas. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 35 of 65

SWMU Identifier **OWS 163** **Refer to Figure #** Figure I3-4 & I3-5

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 134A

TPH CAA TPH CAA-04A

Associated Building 163A **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Equipment Maintenance (Plant Service A/C)

Additional Information Outside southwestern portion of Building 163A; approximate location shown on figure

Operational Information for SWMU

Type of Unit Oil-Water Separator

Capacity (gallons) Unknown

Period of Operation Unknown

Material Managed at SWMU Unknown

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources Final RCRA Tech Memo (Tetra Tech 2003)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

OWS 163 is located within CAA 4A and CERCLA Site 4. OWS 163 was not specifically targeted in the EBS (IT 2001); however, nearby soil and groundwater samples were collected (location 134-006-034). Other CERCLA-related groundwater samples were also collected from location 4-2-ADD30. Samples were analyzed for TPH, metals (soil only), and VOCs. Although analyzed, metals were not evaluated in this assessment based on the type of liquids typically received by an OWS. As depicted on the figures for Site 4 (South), all soil analytes were either not detected or detected at concentrations below residential EPA PRGs (EPA 2002). Petroleum products in groundwater were not detected. VOCs in groundwater were detected at concentrations above MCLs (California Department of Health Services 2003). OWS 163 is located within an OU-wide chlorinated VOC groundwater plume. OWS 163 was listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). Further action is recommended for OWS 163. The OU-wide groundwater plume is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 36 of 65

SWMU Identifier	OWS 360	Refer to Figure #	Figure I3-3
Navy Recommendation/Closure Status	Further Action Recommended		

Location Description

Disposal Parcel	EDC 10	CERCLA Site	4		
EBS Subparcel	143	TPH CAA	NA		
Associated Building	360	Building Status	Present	Leasing Status	Not leased by ARRA
Building Name	Aircraft Engine and Air Frame Overhaul Facility				
Additional Information	Former OWS at Building 360				

Operational Information for SWMU

Type of Unit	Oil-Water Separator
Capacity (gallons)	Unknown
Period of Operation	Unknown
Material Managed at SWMU	Unknown

Source of Initial SWMU Identification

SWMU # in RFA	Not identified in RFA	Recommendation in RFA	NA
Recommendation for NFA from DTSC in 1999	NA		
SWMU Identified in Other Sources	Final FSP for Data Gap Sampling (Tetra Tech 2001)		

Tank-Related Information

Status of Tank	NA	Status of Associated Aboveground Pipes	NA
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Data Analysis

OWS-360 was formerly located within CERCLA Site 4. Nearby CERCLA soil and groundwater samples were collected and analyzed for TPH, metals, VOCs, SVOCs, PAHs, or organotins (soil only). Although analyzed, metals, PAHs, and organotins were not evaluated in this assessment based on the type of liquids typically received by an OWS. As depicted on the figure for Site 4 (North), all soil analytes evaluated were either not detected or detected at concentrations below residential EPA PRGs (EPA 2002). Groundwater results from up to 16 sampling events at Well 360-4 are summarized and presented. TPH-diesel in groundwater was historically detected at a concentration above the total TPH PRC for aquatic receptors (Navy 2001) in one well sample (June 2001). Multiple VOCs in groundwater were historically detected at concentrations above MCLs (California Department of Health Services 2003). OWS 360 was listed as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). Further action is recommended for OWS 360. Groundwater is contaminated with TPH and chlorinated hydrocarbons (commingled). With the commingled plume, OWS 360 will be evaluated and closed under the CERCLA program. The OU-wide groundwater plume is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

2002 visit: OWS was removed.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 37 of 65

SWMU Identifier **OWS 372A** Refer to Figure # Figure I3-4 & I3-5

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 134A

TPH CAA CAA-04B

Associated Building 372 Building Status Present Leasing Status Not leased by ARRA

Building Name Turbo Prop Test Cell

Additional Information West of Building 372; approximate location shown on figure

Operational Information for SWMU

Type of Unit Oil-Water Separator

Capacity (gallons) 3,750

Period of Operation Unknown

Material Managed at SWMU Oil/water mixture

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA Recommendation in RFA NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

OWS-372A is located within CAA 4B and CERCLA Site 4 and is approximately 5 feet west of a former fuel line. A groundwater sample was collected near the OWS during CAA sampling in April 2000 (CA04-01). The sample was analyzed for TPH and VOCs. As depicted on the groundwater figure for Site 4 (South), TPH was not detected while VOCs were detected at concentrations below residential EPA PRGs (EPA 2002). However, other historical soil and groundwater samples results (related to other nearby SWMUs) indicate groundwater in the vicinity is contaminated with TPH and chlorinated hydrocarbons. Hit boxes are presented for selected sampling locations with elevated results. OWS 372A was identified as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). Further action is recommended for OWS 372A. The OU-wide groundwater plume (with commingled TPH and chlorinated hydrocarbons) present in the vicinity is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 38 of 65

SWMU Identifier **OWS 372B** Refer to Figure # Figure I3-4 & I3-5

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 4

EBS Subparcel 134A

TPH CAA CAA-04B

Associated Building 372 Building Status Present Leasing Status Not leased by ARRA

Building Name Turbo Prop Test Cell

Additional Information Building 372 - OWS outside main entrance to building; approximate location shown on figure

Operational Information for SWMU

Type of Unit Oil-Water Separator

Capacity (gallons) Unknown

Period of Operation Unknown

Material Managed at SWMU Unknown

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA Recommendation in RFA NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 39 of 65

Data Analysis

OWS-372B is located within CAA 4B and CERCLA Site 4. The OWS area was indirectly investigated as Target Area 1 (Building 372) during the EBS Phase 2A soil sampling at Zone 22, Parcel 134 (IT 2001). One soil sample (134-001-007) was collected near the OWS and analyzed for TPH and VOCs. Nearby CERCLA-related soil and groundwater samples (372-15-MOJ and S04-DGS-DP15) were also collected and analyzed for TPH, VOCs, and/or PAHs. Although analyzed, PAHs were not evaluated in this assessment based on the type of liquids typically received by an OWS. As depicted on the figures for Site 4 (South), VOCs in groundwater were detected at concentrations below MCLs (California Department of Health Services 2003), while petroleum products in groundwater at one CERCLA location (372-15-MOJ) were detected at concentrations above the total TPH PRC for aquatic receptors (Navy 2001). All soil analytes evaluated, however, including analytes from a sample coincident with the previous elevated groundwater results, were either not detected or detected at concentrations below residential PRCs (Navy 2001) and EPA PRGs (EPA 2002). OWS 372B was not identified as a likely source of soil and groundwater contamination at Site 4 in the OU-2B RI report (Tetra Tech 2005). An OU-wide groundwater plume with commingled TPH and chlorinated hydrocarbons present in the vicinity is the likely source of TPH detected in groundwater. No further action is recommended for OWS 372B.

Nondetect Review

Nondetect values were compared to 2004 Region 9 residential PRGs and Cal-modified PRGs, when available; groundwater nondetect values were also compared to California MCLs. All nondetect values for VOCs in soil less than PRGs. All nondetect values for metals in soil less than PRGs.

All nondetect values for VOCs in groundwater less than PRGs and MCLs (when available) except 1,2-dichloroethane and 1,1,1,2-tetrachloroethane; the nondetect values were greater than PRGs but less than or equal to MCLs for benzene, 1,4-dichlorobenzene, tetrachloroethene, 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane, and vinyl chloride.

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 40 of 65

SWMU Identifier **AST 014A**

Refer to Figure # NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 11

EBS Subparcel 137

TPH CAA NA

Associated Building 014 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Engine Test Cell

Additional Information Inside Building 14; approximate location in Test Cell 4

Operational Information for SWMU

Type of Unit Aboveground Storage Tank(s)

Capacity (gallons) 50

Period of Operation Unknown

Material Managed at SWMU Preservative oil

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994)

Tank-Related Information

Status of Tank Removed; building is currently occupied by a tenant **Status of Associated Aboveground Pipes** Removed

Data Analysis

Based on the AST's limited capacity, location within Building 14, and tank content, there is no reason to suspect subsurface contamination. AST 014A was not listed as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for AST 014A.

Nondetect Review

NA

Site Visit(s)

AST removed prior to 2002 site visit.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 41 of 65

SWMU Identifier	AST 014B		Refer to Figure #	NA
Navy Recommendation/Closure Status	NFA Recommended			
<u>Location Description</u>				
Disposal Parcel	EDC 10	CERCLA Site	11	
EBS Subparcel	137	TPH CAA	NA	
Associated Building	014	Building Status	Present	Leasing Status Leased by ARRA
Building Name	Engine Test Cell			
Additional Information	Inside Building 14; approximate location in Test Cell 4			
<u>Operational Information for SWMU</u>				
Type of Unit	Aboveground Storage Tank(s)			
Capacity (gallons)	50			
Period of Operation	Unknown			
Material Managed at SWMU	Compressor cleaning solution			
<u>Source of Initial SWMU Identification</u>				
SWMU # in RFA	Not identified in RFA	Recommendation in RFA	NA	
Recommendation for NFA from DTSC in 1999		NA		
SWMU Identified in Other Sources	EBS (IT 2001)			
<u>Tank-Related Information</u>				
Status of Tank	Removed; building is currently occupied by a tenant	Status of Associated Aboveground Pipes	Removed	

Data Analysis

Based on the AST's limited capacity, location within Building 14, and tank content, there is no reason to suspect subsurface contamination. AST 014B was not listed as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for AST 014B.

Nondetect Review

NA

Site Visit(s)

AST removed prior to 2002 site visit.

Table 13-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 42 of 65

SWMU Identifier **AST 014C** Refer to Figure # NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10 CERCLA Site 11

EBS Subparcel 137 TPH CAA NA

Associated Building 014 Building Status Present Leasing Status Leased by ARRA

Building Name Engine Test Cell

Additional Information Inside Building 14 in control room for Test Cells 3 and 4 (1 of 2); approximate location

Operational Information for SWMU

Type of Unit Aboveground Storage Tank(s)

Capacity (gallons) 55

Period of Operation Unknown

Material Managed at SWMU Smoke abatement chemical

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA Recommendation in RFA NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources TPH Data Gap Sampling Report (Tetra Tech 2001)

Tank-Related Information

Status of Tank Removed; building is currently occupied by a tenant Status of Associated Aboveground Pipes Removed

Data Analysis

Based on the AST's limited capacity, location within Building 14, and tank content, there is no reason to suspect subsurface contamination. AST 014C was not listed as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for AST 014C.

Nondetect Review

NA

Site Visit(s)

AST removed prior to 2002 site visit.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 43 of 65

SWMU Identifier **AST 014D**

Refer to Figure # NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 11

EBS Subparcel 137

TPH CAA NA

Associated Building 014 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Engine Test Cell

Additional Information Inside Building 14 in control room for Test Cells 3 and 4 (2 of 2); approximate location

Operational Information for SWMU

Type of Unit Aboveground Storage Tank(s)

Capacity (gallons) 55

Period of Operation Unknown

Material Managed at SWMU Smoke abatement chemical

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources TPH Data Gap Sampling Report (Tetra Tech 2001)

Tank-Related Information

Status of Tank Removed; building is currently occupied by a tenant **Status of Associated Aboveground Pipes** Removed

Data Analysis

Based on the AST's limited capacity, location within Building 14, and tank content, there is no reason to suspect subsurface contamination. AST 014D was not listed as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for AST 014D.

Nondetect Review

NA

Site Visit(s)

AST removed prior to 2002 site visit.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 44 of 65

SWMU Identifier **NADEP GAP 47** Refer to Figure # **NA**

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel **EDC 10**

CERCLA Site **11**

EBS Subparcel **137**

TPH CAA **NA**

Associated Building **014** Building Status **Present** Leasing Status **Leased by ARRA**

Building Name **Engine Test Cell**

Additional Information **Inside Building 14, approximate location in Shop 96233; sump**

Operational Information for SWMU

Type of Unit **Generator Accumulation Point**

Capacity (gallons) **Unknown**

Period of Operation **GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.**

Material Managed at SWMU **Sump with 1010, Mil-L-23699 lubrication, and engine oils**

Source of Initial SWMU Identification

SWMU # in RFA **Not identified in RFA** Recommendation in RFA **NA**

Recommendation for NFA from DTSC in 1999 **NA**

SWMU Identified in Other Sources **CERFA EBS (ERM-West 1994); EBS (IT 2001)**

Tank-Related Information

Status of Tank **NA**

Status of Associated Aboveground Pipes **NA**

Data Analysis

NADEP GAP 47 was not included in the RFA. According to the Phase I EBS, NADEP GAP 47 consisted of a sump (removed) that stored lubrication and motor oil inside of Building 014. The Phase I EBS concluded that the GAP did not require further investigation because staining was not observed by site inspectors (ERM-West 1994). A description of NADEP GAP 47 was included in the EBS, Zone 17, Parcel 137 evaluation data summary report (IT 2001). A 2002 site visit confirmed EBS observations. No staining, corrosion, or obvious pathway through the floor was apparent in the vicinity of the former GAP. NADEP GAP 47 was not listed as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 47.

Nondetect Review

NA

Site Visit(s)

2002 visit: Faded red markings painted on the concrete inside of Building 014 are all that remains of NADEP GAP 47. The surrounding area is covered with sawdust from machinery used by the current tenant. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 45 of 65

SWMU Identifier **NADEP GAP 48** **Refer to Figure #** NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10 **CERCLA Site** 11

EBS Subparcel 137 **TPH CAA** NA

Associated Building 014 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Engine Test Cell

Additional Information Inside Building 14, approximate location in Shop 96233

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) 55-gallon drums

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU 1010, lubrication and engine oils, PD-680, aerosol paint, aerosol lubrication spray, and solvents, oil rags and shop paper towels, air filters contaminated with oil and solvents

Source of Initial SWMU Identification

SWMU # in RFA GI-42 **Recommendation in RFA** RFI Not Required

Recommendation for NFA from DTSC in 1999 Yes

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994); EBS (IT 2001)

Tank-Related Information

Status of Tank NA **Status of Associated Aboveground Pipes** NA

Data Analysis

NADEP GAP 48 consisted of a 55-gallon storage drum resting on a wooden pallet atop a poly spill pallet, which acted as a secondary containment system. Other 55-gallon drums were placed on pallets without secondary containment. The area measured approximately 3 feet by 10 feet and was located inside the east end of the Building 14 main hallway. According to the RFA, NADEP GAP 48 exhibited a low potential for releases into soil and groundwater because the GAP was located indoors on a concrete floor. An RFI was not required (DTSC 1992). The Phase I EBS (ERM-West 1994) concluded that the GAP did not require further investigation because site inspectors observed no staining or other evidence of spills associated with the GAP. A letter from DTSC dated November 4, 1999, recommended NFA for this SWMU (DTSC 1999). A description of NADEP GAP 48 was included in the EBS, Zone 17, Parcel 137, evaluation data summary report (IT 2001). NADEP GAP 48 was not listed as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 48.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 46 of 65

SWMU Identifier **OWS 014A** Refer to Figure # **Figure I3-6**

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel **EDC 10**

CERCLA Site **11**

EBS Subparcel **137**

TPH CAA **TPH CAA-11A**

Associated Building **014** Building Status **Present** Leasing Status **Leased by ARRA**

Building Name **Engine Test Cell**

Additional Information **1 of 4 OWSs at Building 14 - located on southern side in 2nd bay from the western end; approximate location is shown on figure**

Operational Information for SWMU

Type of Unit **Oil-Water Separator**

Capacity (gallons) **1,100**

Period of Operation **Unknown**

Material Managed at SWMU **Oil/water mixture**

Source of Initial SWMU Identification

SWMU # in RFA **Not identified in RFA** Recommendation in RFA **NA**

Recommendation for NFA from DTSC in 1999 **NA**

SWMU Identified in Other Sources **Final FSP for Data Gap Sampling (Tetra Tech 2001)**

Tank-Related Information

Status of Tank **NA**

Status of Associated Aboveground Pipes **NA**

Data Analysis

OWS 014A is located within CAA 11A and CERCLA Site 11 at the south end of Building 14. CAA soil and shallow groundwater samples were collected from one location (CA11-016). Samples were analyzed for TPH, metals, VOCs, and PAHs (groundwater only). Although analyzed, metals and PAHs were not evaluated in this assessment based on the type of liquids typically received by an OWS. Additionally, two CERCLA shallow groundwater samples were collected and analyzed for VOCs and TPH. As depicted on the figure for Site 11, TPH and VOCs in soil and VOCs in shallow groundwater were not detected. TPH in shallow groundwater was detected at concentrations exceeding the total TPH PRC for aquatic receptors (Navy 2001). Detected concentrations indicate a potential for free product (JP-5) in groundwater. OWS 14A was identified as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). Further action is recommended for OWS 14A. TPH Program contaminants in CAA 11A are commingled with CERCLA contaminants and will be addressed under CERCLA. An OU-wide groundwater plume is present in the vicinity and is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 47 of 65

SWMU Identifier **OWS 014B** **Refer to Figure #** Figure I3-6

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 11

EBS Subparcel 137

TPH CAA TPH CAA-11A

Associated Building 014 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Engine Test Cell

Additional Information 2 of 4 OWSs at Building 14 - located on southern side in 4th bay from the western end; approximate location is shown on figure

Operational Information for SWMU

Type of Unit Oil-Water Separator

Capacity (gallons) 1,100

Period of Operation Unknown

Material Managed at SWMU Oil/water mixture

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources TPH Data Gap Sampling Report (Tetra Tech 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 48 of 65

Data Analysis

OWS-014B is located south of Building 14 within CAA 11A and CERCLA Site 11. An OU-wide groundwater plume is present in the vicinity and is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005). Nearby CAA soil and shallow groundwater samples were, however, collected from one location (CA11-17). Samples were analyzed for TPH, metals, and VOCs. Although analyzed, metals were not evaluated in this assessment based on the type of liquids typically received by an OWS. As depicted on the figure for Site 11, TPH and VOCs in soil and shallow groundwater were not detected or were detected at concentrations below MCLs (California Department of Health Services 2003). OWS-014B was not identified as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). No further action is recommended for OWS 14B.

Nondetect Review

Nondetect values were compared to 2004 Region 9 residential PRGs and Cal-modified PRGs, when available; groundwater nondetect values were also compared to California MCLs. All nondetect values for VOCs in soil less than PRGs.

All nondetect values for VOCs in groundwater less than PRGs and MCLs (when available) except carbon tetrachloride, chloroethane, chloroform, cis-1,3-dichloropropene, 1,2-dichloroethane, dibromochloromethane, bromodichloromethane, methylene chloride, and trans-1,3-dichloropropene; the nondetect values were greater than PRGs but less than or equal to MCLs for benzene, 1,2-dichloropropane, tetrachloroethene, 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane, and vinyl chloride.

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 49 of 65

SWMU Identifier **OWS 014C**

Refer to Figure # Figure I3-6

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 11

EBS Subparcel 137

TPH CAA TPH CAA-11A

Associated Building 014 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Engine Test Cell

Additional 3 of 4 OWSs at Building 14 - located at northeastern corner of building

Information (aboveground); approximate location is shown on figure

Operational Information for SWMU

Type of Unit Oil-Water Separator

Capacity (gallons) 1,300

Period of Operation Unknown

Material Managed Oil/water mixture
at SWMU

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources TPH Data Gap Sampling Report (Tetra Tech 2001)

Tank-Related Information

Status of Tank NA

Status of Associated NA
Aboveground Pipes

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 50 of 65

Data Analysis

OWS-014C is located at the northeast corner of Building 14 within CAA 11A and CERCLA Site 11. An OU-wide groundwater plume is present in the vicinity and is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005). Nearby CAA soil and shallow groundwater samples were, however, collected from one location (CA11-15). Samples were analyzed for TPH, metals, and VOCs. Although analyzed, metals were not evaluated in this assessment based on the type of liquids typically received by an OWS. As depicted on the figure for Site 11, TPH and VOCs in soil and shallow groundwater were not detected. OWS 14C was not identified as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). No further action is recommended for OWS 14C.

Nondetect Review

Nondetect values were compared to 2004 Region 9 residential PRGs and Cal-modified PRGs, when available; groundwater nondetect values were also compared to California MCLs. All nondetect values for VOCs in soil less than PRGs.

All nondetect values for VOCs in groundwater less than PRGs and MCLs (when available) except carbon tetrachloride, chloroethane, chloroform, cis-1,3-dichloropropene, 1,2-dichloroethane, dibromochloromethane, bromodichloromethane, methylene chloride, and trans-1,3-dichloropropene; the nondetect values were greater than PRGs but less than or equal to MCLs for benzene, 1,2-dichloropropane, tetrachloroethene, 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane, and vinyl chloride.

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 51 of 65

SWMU Identifier **OWS 014D** Refer to Figure # Figure I3-6

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 11

EBS Subparcel 137

TPH CAA TPH CAA-11A

Associated Building 014 Building Status Present Leasing Status Leased by ARRA

Building Name Engine Test Cell

Additional Information 4 of 4 OWSs at Building 14 - located on western side of building; approximate location is shown on figure

Operational Information for SWMU

Type of Unit Oil-Water Separator

Capacity (gallons) 135

Period of Operation Unknown

Material Managed at SWMU Oil/water mixture

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA Recommendation in RFA NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources TPH Data Gap Sampling Report (Tetra Tech 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

OWS-014D is located west of Building 14 within CAA 11A and CERCLA Site 11. A CERCLA shallow groundwater data gap sample was collected from one nearby location. The sample was analyzed for TPH, VOCs, and PAHs. Although analyzed, PAHs were not evaluated in this assessment based on the type of liquids typically received by an OWS. As depicted on the figure for Site 11, TPH and VOCs in shallow groundwater were not detected or were detected at concentrations below MCLs (California Department of Health Services 2003). No nearby soil sample results are available; however, OWS 14D was identified as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). Further action is recommended for OWS 14D. An OU-wide groundwater plume is present in the vicinity and is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005).

Nondetect Review

NA

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 52 of 65

SWMU Identifier **OWS 014E** **Refer to Figure #** Figure I3-6

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 11

EBS Subparcel 137

TPH CAA NA

Associated Building 014 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Engine Test Cell

Additional Information Building 14 - OWS inside of building; Engine Canning Area; 45 ft east of western wall on room's east-west center line beneath two manhole covers; approximate location shown on figure

Operational Information for SWMU

Type of Unit Oil-Water Separator

Capacity (gallons) Unknown

Period of Operation Unknown

Material Managed at SWMU Unknown

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

OWS-014E is located inside Building 14 within CAA 11A and CERCLA Site 11. The building was used as an engine construction and firing location. An OU-wide groundwater plume is present in the vicinity and is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005). The EBS Phase I site inspection noted significant staining on the floors in certain areas of the building, consistent with large spills of fuels and oils (ERM-West 1994). These areas were investigated as Target Area 1 (Building 14) in the Phase 2 EBS; one soil sample (137-0002M) was collected in the vicinity of OWS-014E. In addition, a CERCLA shallow grab groundwater sample (122-S04-219) was also collected nearby. The samples were analyzed for TPH and VOCs, respectively; however, TPH was not detected and VOCs in shallow groundwater were not detected or were detected at concentrations below MCLs (California Department of Health Services 2003). OWS 14E was not identified as a likely source of soil and groundwater contamination at Site 11 in the OU-2B RI report (Tetra Tech 2005). No further action is recommended for OWS 14E.

Nondetect Review

Nondetect values were compared to 2004 Region 9 residential PRGs and Cal-modified PRGs, when available; groundwater nondetect values were also compared to California MCLs. The nondetect values for VOCs in groundwater were greater than PRGs but less than or equal to MCLs for benzene, tetrachloroethene, and vinyl chloride.

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 53 of 65

SWMU Identifier	UST(R)-06	Refer to Figure #	NA
Navy Recommendation/Closure Status	Further Action Recommended		
<u>Location Description</u>			
Disposal Parcel	EDC 10	CERCLA Site	11
EBS Subparcel	137	TPH CAA	TPH CAA-11A
Associated Building	014	Building Status	Present
		Leasing Status	Leased by ARRA
Building Name	Engine Test Cell		
Additional Information	USTs 14-1, 14-2, 14-3, 14-4, 14-5, and 14-6		

Operational Information for SWMU

Type of Unit	Underground Storage Tank(s)
Capacity (gallons)	10,000 gal (USTs 14-1, -2, and -3); 1,000 gal (UST 14-4); 4,500 gal (UST 14-5); 600 gal (UST 14-6)
Period of Operation	Unknown
Material Managed at SWMU	Lubricating Oil (USTs 14-1, -2, and -3), Waste Oil (UST 14-4), Gasoline (UST 14-5), and Diesel (UST 14-6)

Source of Initial SWMU Identification

SWMU # in RFA	UST-06	Recommendation in RFA	RFI Not Required
Recommendation for NFA from DTSC in 1999		NA	
SWMU Identified in Other Sources	UST Summary Report (Tetra Tech 2003)		

Tank-Related Information

Status of Tank	Removed	Status of Associated Aboveground Pipes	NA
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Data Analysis

USTs 14-1 through 14-6, collectively referred to as UST(R)-06, were associated with Building 14 operations. USTs 14-1 through 14-3 were steel, 10,000-gallon tanks that stored lubricating oil. These tanks were removed in November 1994, with no over-excavation. Two USTs were observed to be in good condition upon removal, but UST 14-1 had a single hole on the north side of the tank. UST 14-4, a steel, 1,000-gallon waste oil tank, was removed in November 1994. Over-excavation of this tank was conducted as part of a hotspot removal of TPH-contaminated soil. UST 14-5, a steel, 4,500-gallon gasoline tank, was removed in December 1994 and was observed to have a single hole on the west side of the tank. Over-excavation of this tank was also conducted as part of a hotspot removal of TPH-contaminated soil. UST 14-6, a steel, 600-gallon diesel tank, was removed in November 1994 with no over-excavation. The tank was observed to be in good condition upon removal. All USTs are located within CAAs 11A and 11B and CERCLA Site 11. USTs 14-1 through 14-6 were identified as likely sources of soil and groundwater contamination at the Site 11 in the OU-2B RI (Tetra Tech 2005). No data are presented on figures. Groundwater and soil remediation are in progress. Further action is recommended for UST(R)-06. Corrective action is in progress in the area under the TPH program; however, with the nearby OU-wide chlorinated hydrocarbon plume (commingled), groundwater at the tank sites will be addressed as part of the OU-wide groundwater plume under the CERCLA program.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 54 of 65

SWMU Identifier **AOC 398** Refer to Figure # Figure I3-7
Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10 CERCLA Site 21
EBS Subparcel 127 TPH CAA TPH CAA-03A
Associated Building 398 Building Status Present Leasing Status Leased by ARRA
Building Name Turbine Accessories Shop
Additional USTs 398-1 and 398-2
Information

Operational Information for SWMU

Type of Unit Underground Storage Tank(s)
Capacity (gallons) 10,000 gal (UST 398-1) and 10,000 gal (UST 398-2)
Period of Operation Unknown
Material Managed JP-5 (UST 398-1) and JP-TS (UST 398-2)
at SWMU

Source of Initial SWMU Identification

SWMU # in RFA AOC Recommendation in RFA RFI Required
Recommendation for NFA from DTSC in 1999 NA
SWMU Identified in Other Sources UST Summary Report (Tetra Tech 2003)

Tank-Related Information

Status of Tank Removed Status of Associated NA
Aboveground Pipes

Data Analysis

At AOC 398, the steel, 10,000-gallon USTs (398-1 and 398-2) stored JP-5 and JP-TS from the time they were installed in 1969 until they were removed in April 1995; no over-excavation was conducted. USTs 398-1, and 398-2 were identified as likely sources of soil and groundwater contamination at the Site 21 in the OU-2B RI (Tetra Tech 2005). The former tank sites are located within CAA 3A and CERCLA Site 21. Floating product was detected during the UST removals and subsequent remedial investigation. A localized plume of chlorinated hydrocarbons (including 1,1-dichloroethane and vinyl chloride detected at concentrations exceeding MCLs [California Department of Health 2003]) was also detected. Representative TPH groundwater data are presented on the figure. Further action is recommended for AOC 398. Corrective action under the TPH program was conducted through investigations in 1995 and 2000; however, with the commingled plume, groundwater at the tank site will be addressed as part of the OU-wide groundwater plume under the CERCLA program.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 55 of 65

SWMU Identifier	M-07	Refer to Figure #	NA
Navy Recommendation/Closure Status	NFA Recommended		
<u>Location Description</u>			
Disposal Parcel	EDC 10	CERCLA Site	21
EBS Subparcel	127	TPH CAA	NA
Associated Building	398	Building Status	Present
		Leasing Status	Leased by ARRA
Building Name	Turbine Accessories Shop		
Additional Information	Inside Building 398, Solvent distillation unit; Drize Test Shop		
<u>Operational Information for SWMU</u>			
Type of Unit	Miscellaneous Sites		
Capacity (gallons)	15		
Period of Operation	Unknown		
Material Managed at SWMU	PD-680, paint thinners, and acetone		
<u>Source of Initial SWMU Identification</u>			
SWMU # in RFA	M-07	Recommendation in RFA	RFI Not Required
Recommendation for NFA from DTSC in 1999	NA		
SWMU Identified in Other Sources	EBS (IT 2001)		
<u>Tank-Related Information</u>			
Status of Tank	NA	Status of Associated Aboveground Pipes	NA

Data Analysis

M-07 consisted of a portable 15-gallon solvent distillation unit. The unit was located in the Drize Test area of Building 398. According to the RFA, no RFI was recommended for M-07 because the unit was located inside and on a concrete floor (DTSC 1992). A brief description of M-07 was included in the EBS Zone 17, Parcel 127 evaluation data summary report (IT 2001). A 2002 site visit could not identify the exact location in Building 398 because the tenant had remodeled the floors. M-07 was not listed as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for M-07.

Nondetect Review

NA

Site Visit(s)

2002 visit: No definitive markings are left in Building 398 to denote the exact location of M-07. The tenants of the building replaced all of the floors and remodeled the inside. According to one of the tenants, the floors were washed, stripped, and cleaned until any staining was removed. All cracks were repaired and the floors were painted twice then sealed. The floors look new.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 56 of 65

SWMU Identifier **NADEP GAP 44** Refer to Figure # Figure I3-7

Navy Recommendation/Closure Status **Further Action Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 21

EBS Subparcel 127

TPH CAA NA

Associated Building 398 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Turbine Accessories Shop

Additional Information Building 398, Shop 96327 (Turbine Accessory Shop); outside of building east of northern wing; area 4 feet by 6 feet on concrete; approximate location shown on figure

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) 1500 (3 500-gallon bowsters)

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Lube oil, JP-5, and M-114 solvent

Source of Initial SWMU Identification

SWMU # in RFA GI-39

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 57 of 65

Data Analysis

NADEP GAP 44 consisted of three 500-gallon square containers (also known as bowsters) located outside of Building 398. According to the RFA, the bowsters were stained, indicating at least some small spills when handling wastes. The potential for releases into soil and groundwater was considered low because the units had built-in pallets and were situated on concrete (DTSC 1992). The GAP was investigated as Phase 2A Target Area 2 in the EBS, Zone 17, Parcel 127 evaluation data summary report (IT 2001). Three EBS samples were collected to address observed surface staining; only one soil sample was collected near the GAP (127-SN-003). Additionally, soil and grab groundwater samples related to UST removals (USTs 398-1 and 398-2) and CERCLA data gap sampling were also collected nearby. Samples were analyzed for TPH, metals, VOCs, SVOCs (soil only), pesticides (soil only), and PAHs. Although analyzed, metals, pesticides, and PAHs were not evaluated in this assessment based on the type of materials managed at the GAP. TPH, VOCs, and SVOCs in soil were not detected. Hit boxes are presented for selected sampling locations with elevated results. As depicted on the figure for Site 21, total TPH in groundwater exceeded the groundwater PRC for aquatic receptors (Navy 2001) at one location (398-L); concentrations suggest free product is present. Additionally, selected VOCs in groundwater exceeded MCLs (California Department of Health Services 2003). The elevated concentrations of TPH are most likely related to former USTs 398-1 (JP-5) and 398-2 (JP-TS). Floating product was detected during the UST removals and subsequent remedial investigation. Corrective action under the TPH program is ongoing for the USTs. Based on the low frequency and concentrations of detected analytes during the EBS GAP sampling, no additional sampling was recommended (IT 2001). NADEP GAP 44 was listed as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). The elevated TPH concentrations are commingled with a small, chlorinated, VOC plume. Further action under the CERCLA program is recommended for NADEP GAP 44.

Nondetect Review

NA

Site Visit(s)

2002 visit: A partial rectangular area painted red and white, marking a hazardous waste area on the ground outside of Building 398, is all that remains of NADEP GAP 44. The site was located next to a UST. When remediation of the UST occurred, most of the concrete in the area was removed. The former NADEP GAP 44 is almost completely covered with new asphalt, applied following remediation of the tank.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 58 of 65

SWMU Identifier **NADEP GAP 45** Refer to Figure # NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 21

EBS Subparcel 127

TPH CAA NA

Associated Building 398 Building Status Present Leasing Status Leased by ARRA

Building Name Turbine Accessories Shop

Additional Information Building 398, Shop 96327 (Turbine Accessory Shop); approximate location in a covered hallway to the east wing; area 5 feet by 5 feet on concrete

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) 30- and 55-gallon drums

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Aerosol paint and paper towels contaminated with oil

Source of Initial SWMU Identification

SWMU # in RFA GI-40

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 45 consisted of 30- and 55-gallon drums atop a wooden pallet located under a covered hallway outside of Building 398. According to the RFA, there was a low potential for releases into the soil and groundwater because the unit was undercover on a concrete floor (DTSC 1992). Based on the low frequency and concentrations of detected analytes during the EBS sampling, no additional sampling was recommended (IT 2001). A 2002 site visit described a nearby expansion joint in the concrete floor, but no stains were apparent within the joint. NADEP GAP 45 was not listed as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 45.

Nondetect Review

NA

Site Visit(s)

2002 visit: A faded red and white rectangle painted on concrete outside of Building 398 (under a covered hallway), marking a hazardous waste containment area, is all that remains of NADEP GAP 45. The surrounding area is vacant. Minor staining, most likely from the outside elements (water and bird debris), is visible. An expansion joint is present in the concrete, but no stains are apparent within the joint.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 59 of 65

SWMU Identifier	NADEP GAP 46	Refer to Figure #	NA
Navy Recommendation/Closure Status	NFA Recommended		
<u>Location Description</u>			
Disposal Parcel	EDC 10	CERCLA Site	21
EBS Subparcel	135	TPH CAA	NA
Associated Building	162	Building Status	Present
		Leasing Status	Leased by ARRA
Building Name	Ship and Aircraft Maintenance Shop		
Additional Information	Inside Building 162, approximate location in Shop 96324		

Operational Information for SWMU

Type of Unit	Generator Accumulation Point
Capacity (gallons)	Varied containers up to 55-gallon drums
Period of Operation	GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.
Material Managed at SWMU	Aerosol paint, 1,1,1-TCA, lubrication oil, PD-680, and acetone

Source of Initial SWMU Identification

SWMU # in RFA	GI-41	Recommendation in RFA	RFI Not Required
Recommendation for NFA from DTSC in 1999		Yes	
SWMU Identified in Other Sources	CERFA EBS (ERM-West 1994); EBS (IT 2001)		

Tank-Related Information

Status of Tank	NA	Status of Associated Aboveground Pipes	NA
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Data Analysis

NADEP GAP 46 consisted of 55-gallon storage drums resting atop a poly spill pallet, which acted as a secondary containment system. Other 55-gallon drums were placed on pallets without secondary containment. The area measured approximately 5 feet by 12 feet and was located inside Building 162. According to the RFA, NADEP GAP 46 was a low-priority site that exhibited a low potential for releases into soil and groundwater because the GAP was located indoors on a concrete floor. An RFI was not required (DTSC 1992). The Phase I EBS (ERM-West 1994) concluded that the GAP did not require further investigation because site inspectors did not observe staining. A letter from DTSC dated November 4, 1999, recommended NFA for this SWMU (DTSC 1999). A description of NADEP GAP 46 was included in the EBS, Zone 17, Parcel 135 evaluation data summary report (IT 2001). NADEP GAP 46 was not listed as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 46.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 60 of 65

SWMU Identifier **NADEP GAP 76** Refer to Figure # **NA**
Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel **EDC 10** CERCLA Site **21**
EBS Subparcel **136** TPH CAA **NA**
Associated Building **113** Building Status **Present** Leasing Status **Leased by ARRA**
Building Name **A/C Parts Shipping Container Overhaul**
Additional Information **Inside Building 113, approximate location in Shop 96212**

Operational Information for SWMU

Type of Unit **Generator Accumulation Point**
Capacity (gallons) **Aerosol cans, 55-gallon drums**
Period of Operation **GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.**
Material Managed at SWMU **Aerosol paint and rust remover, dope and lacquer thinner, some oil, enamel paint, and 1,1,1-TCA**

Source of Initial SWMU Identification

SWMU # in RFA **GI-56** Recommendation in RFA **RFI Not Required**
Recommendation for NFA from DTSC in 1999 **Yes**
SWMU Identified in Other Sources **CERFA EBS (ERM-West 1994)**

Tank-Related Information

Status of Tank **NA** Status of Associated Aboveground Pipes **NA**

Data Analysis

NADEP GAP 76 consisted of 55-gallon storage drums resting atop a poly spill pallet, which acted as a secondary containment system. Another 55-gallon drum sat on the floor without secondary containment. The area measured approximately 5 feet by 8 feet and was located on a concrete floor inside Building 113. An adjacent area stored product in 55-gallon drums; the drums sat in metal trays, which acted as a secondary containment systems. According to the RFA, NADEP GAP 76 was a low-priority site that exhibited a low potential for releases into soil and groundwater because the GAP was located indoors on a concrete floor. An RFI was not required (DTSC 1992). The Phase I EBS (ERM-West 1994) concluded that the GAP did not require further investigation. A letter from DTSC dated November 4, 1999, recommended NFA for this SWMU (DTSC 1999). A description of NADEP GAP 76 was included in the EBS, Zone 17, Parcel 136 evaluation data summary report (IT 2001). NADEP GAP 76 was not listed as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 76.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 61 of 65

SWMU Identifier **NADEP GAP 77** **Refer to Figure #** NA

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 21

EBS Subparcel 136

TPH CAA NA

Associated Building 113 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name A/C Parts Shipping Container Overhaul

Additional Information Inside Building 113, approximate location in Shop 96215, southeastern corner of Building 113

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Concrete floor area (5'x 5')

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Blasting Grit

Source of Initial SWMU Identification

SWMU # in RFA GI-57

Recommendation in RFA RFI Not Required

Recommendation for NFA from DTSC in 1999 Yes

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NADEP GAP 77 consisted of poly bag on a pallet directly connected to a flue. The flue deposited spent blasting grit into the bag. The area measured approximately 5 feet by 5 feet and was located on a concrete floor inside Building 113. According to the RFA, NADEP GAP 77 was a low-priority site that exhibited a low potential for releases into soil and groundwater because the GAP was located indoors on a concrete floor. An RFI was not required (DTSC 1992). The Phase I EBS (ERM-West 1994) concluded that the GAP did not require further investigation. A letter from DTSC dated November 4, 1999, recommended NFA for this SWMU (DTSC 1999). A description of NADEP GAP 77 was included in the EBS, Zone 17, Parcel 136 evaluation data summary report (IT 2001). NADEP GAP 77 was not listed as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NADEP GAP 77.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 62 of 65

SWMU Identifier **NAS GAP 11** **Refer to Figure #** Figure I3-7

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 21

EBS Subparcel 135

TPH CAA NA

Associated Building 162 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Ship and Aircraft Maintenance Shop

Additional Information Inside Building 162; sump to collect waste oils inside of building; approximate location shown on figure

Operational Information for SWMU

Type of Unit Generator Accumulation Point

Capacity (gallons) Unknown

Period of Operation GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.

Material Managed at SWMU Waste oils

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources EBS (IT 2001)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

NAS GAP 11 consisted of a sump used to collect waste oils located inside the southeastern portion of Building 162. This GAP was not included in the RFA. The GAP is located within Zone 17, Parcel 135 and was investigated as Target Area 2 during the EBS Phase 2A soil sampling (IT 2001). Two subsurface soil samples were collected and analyzed for TPH, metals, and VOCs. Although analyzed, metals were not evaluated in this assessment based on the types of material managed at the GAP. As depicted on the figure for Site 21, all analytes were either not detected or detected at concentrations below available residential PRCs (Navy 2001) and EPA PRGs (EPA 2002). The EBS concluded that the waste oil sump, although apparently contributing low levels of TPH and VOCs, did not produce elevated levels of constituents in the soil column below the sump. No additional sampling was recommended during the EBS (IT 2001). NAS GAP 11 was not listed as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for NAS GAP 11.

Nondetect Review

Nondetect values were compared to 2004 Region 9 residential PRGs and Cal-modified PRGs, when available. All nondetect values for VOCs in soil less than PRGs.

Site Visit(s)

2002 visit: No definitive markings are left inside of Building 162 to denote the exact location of NAS GAP 11. The area and surrounding areas are vacant. No staining, corrosion, or obvious pathway through the floor is apparent in the vicinity of the former site.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 63 of 65

SWMU Identifier **OWS 162** **Refer to Figure #** Figure I3-7

Navy Recommendation/Closure Status **NFA Recommended**

Location Description

Disposal Parcel EDC 10

CERCLA Site 21

EBS Subparcel 135

TPH CAA TPH CAA-11A

Associated Building 162 **Building Status** Present **Leasing Status** Leased by ARRA

Building Name Ship and Aircraft Maintenance Shop

Additional Information Southeastern corner of Building 162; approximate location shown on figure

Operational Information for SWMU

Type of Unit Oil-Water Separator

Capacity (gallons) Unknown

Period of Operation Unknown

Material Managed at SWMU Unknown

Source of Initial SWMU Identification

SWMU # in RFA Not identified in RFA **Recommendation in RFA** NA

Recommendation for NFA from DTSC in 1999 NA

SWMU Identified in Other Sources CERFA EBS (ERM-West 1994)

Tank-Related Information

Status of Tank NA

Status of Associated Aboveground Pipes NA

Data Analysis

OWS 162 is located within CAA 11A and CERCLA Site 21 (on the border between Sites 11 and 21). An OU-wide groundwater plume is present in the vicinity and is recommended for further evaluation in a feasibility study under the CERCLA program (Tetra Tech 2005). A CERCLA-related soil sample was, however, collected immediately adjacent to OWS 162 and analyzed for TPH, metals, VOCs, PAHs, pesticides, and, organotins. Although analyzed, metals, PAHs, and organotins were not evaluated in this assessment based on the type of liquids typically received by an OWS. As depicted on the figure for Site 21, TPH, VOCs, and pesticides in soil were not detected or were detected at concentrations below residential PRCs (Navy 2001) and EPA PRGs (EPA 2002). Oil and grease was detected at 772 mg/kg; the concentration was estimated because laboratory control sample recovery was outside established criteria. Because the oil and grease method is a very general, nondiscerning method, it should be noted that no TPH-gasoline or TPH-diesel were detected in a split mobile laboratory sample. OWS 162 was not identified as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). No further action is recommended for OWS 162.

Nondetect Review

Nondetect values were compared to 2004 Region 9 residential PRGs and Cal-modified PRGs, when available. All nondetect values for VOCs in soil less than PRGs. All nondetect values for SVOCs in soil less than PRGs except bis(2-chloroethyl)ether, hexachlorobenzene, and N-nitrosodi-N-propylamine. All nondetect values for pesticides in soil less than PRGs.

Site Visit(s)

OWS was observed during the 2002 site visit; it was inactive.

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 64 of 65

SWMU Identifier	SWMU 162	Refer to Figure #	NA
Navy Recommendation/Closure Status	NFA Recommended		
<u>Location Description</u>			
Disposal Parcel	EDC 10	CERCLA Site	21
EBS Subparcel	135	TPH CAA	NA
Associated Building	162	Building Status	Present
		Leasing Status	Leased by ARRA
Building Name	Ship and Aircraft Maintenance Shop		
Additional Information	Inside Building 162; approximate location in Shop 0542; Laboratory; second floor		

Operational Information for SWMU

Type of Unit	Generator Accumulation Point
Capacity (gallons)	Unknown
Period of Operation	GAPs were formally identified in 1987 and continued to operate until base closure and building cleanup was initiated in 1997. Actual startup dates are unknown.
Material Managed at SWMU	Oil and 1,1,1-TCA

Source of Initial SWMU Identification

SWMU # in RFA	Not identified in RFA	Recommendation in RFA	NA
Recommendation for NFA from DTSC in 1999	Yes		
SWMU Identified in Other Sources	EBS (IT 2001)		

Tank-Related Information

Status of Tank	NA	Status of Associated Aboveground Pipes	NA
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Data Analysis

SWMU 162 was located within a laboratory located inside Building 162, Shop 0542. The Phase I EBS (ERM-West 1994) concluded that the SWMU did not require further investigation because it was located on the upper (second) floor of the building. A letter from DTSC dated November 4, 1999, recommended NFA for this SWMU (DTSC 1999). A description of SWMU 162 was included in the EBS, Zone 17, Parcel 135 evaluation data summary report and the SWMU was referenced to in the EBS as "un-numbered GAP" (IT 2001). SWMU 162 was not listed as a likely source of soil and groundwater contamination at Site 21 in the OU-2B RI report (Tetra Tech 2005). NFA is recommended for SWMU 162.

Nondetect Review

NA

Site Visit(s)

NA

Table I3-1: PROFILES FOR SOLID WASTE MANAGEMENT UNITS IN SITES 3, 4, 11, AND 21 INTEGRATED WITH CERCLA PROGRAM

Solid Waste Management Unit Evaluation Report for Operable Unit 2B

Listed in CERCLA Site Order

Page 65 of 65

Notes:

% = Percentage
ug/kg = Micrograms per kilogram
ug/L = Micrograms per liter
AOC = Area of concern
ARRA = Alameda Reuse and Redevelopment Authority
AST = Aboveground storage tank
bgs = Below ground surface
BTEX = Benzene, toluene, ethylbenzene, and xylene
CAA = Corrective action area
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CERFA = Community Environmental Response Facilitation Act
CRS = Coolant Recovery System
DTSC = California Environmental Protection Agency Department of Toxic Substances Control
EBS = Environmental baseline survey
EDC = Economic development conveyance
EPA = U.S. Environmental Protection Agency
ERM-West = Environmental Resource Management - West
FED = Federal agency-to-agency transfer
FS = Feasibility Study
FSP = Field sampling plan
ft = Foot
Gal = gallon
GAP = Generator accumulation point
GW = Groundwater
ID = Identification
IT = International Technology Corporation
IWTP = Industrial wastewater treatment plant
JP = Jet propellant
M = Miscellaneous area identified in the RFA
MCL = Maximum contaminant level
MEK = Methyl ethyl ketone
mg/kg = Milligrams per kilogram
mg/L = milligrams per liter
mL = milliliter
NA = Not applicable
NADEP = Naval Aviation Depot Alameda
NARF = Naval Air Rework Facility Alameda
NAS = Naval Air Station
Navy = U.S. Department of the Navy
ND = Not detected
NE = Northeast
NFA = No further action
NW = Northwest
OU = Operable Unit
OWS = Oil-water separator
PAH = Polynuclear aromatic hydrocarbon
PCB = Polychlorinated biphenyl
PMB = Plastic material blasting
PPM = Parts per million
PRC = Preliminary remediation criteria
PRG = Preliminary remediation goal
PWC = Navy Public Works Center
(R) = RCRA-related UST
RCRA = Resource Conservation and Recovery Act
RFA = RCRA facility assessment
RFI = RCRA facility investigation
RI = Remedial investigation
RI/FS = Remedial investigation and feasibility study
RWQCB = Regional Water Quality Control Board
SE = Southeast
SEBS = Supplemental environmental baseline survey
SSPORTS = Supervisor of Shipbuilding, Conversion, and Repair, Portsmouth, Virginia
SVOC = Semivolatile organic compound
SW = Southwest
SWARF = Refers to machine and grinding coolant
SWMU = Solid waste management unit
TCA = Trichloroethane
Tetra Tech = Tetra Tech EM Inc.
TPH = Total petroleum hydrocarbon
TPHd = Total petroleum hydrocarbons as diesel
TPHg = Total petroleum hydrocarbons as gasoline
TPHmo = Total petroleum hydrocarbons as motor oil
USFWS = U.S. Fish and Wildlife Service
UST = Underground storage tank
VOC = Volatile organic compound
WD = Washdown area

APPENDIX J
RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT
OU-2B REMEDIAL INVESTIGATION REPORT

APPENDIX J
RESPONSE TO COMMENTS
RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT OU-2B
REMEDIAL INVESTIGATION REPORT, SITES 3, 4, 11, AND 21, ALAMEDA POINT,
ALAMEDA, CALIFORNIA

This document presents the U.S. Department of the Navy's (Navy) responses to comments from the U.S. Environmental Protection Agency (EPA) Region IX, the California Department of Toxic Substances Control (DTSC), the California Regional Water Quality Control Board (RWQCB), and the Alameda Point Restoration Advisory Board (RAB) Operable Unit (OU)-2B Focus Group on the "Draft Remedial Investigation (RI) Report, OU-2B, Sites 3, 4, 11, and 21, Alameda Point, Alameda, California," dated April 1, 2004. The Navy received the comments addressed below from EPA on July 21, 2004. The Navy received the comments addressed below from DTSC's Geologic Services Unit (GSU) and Office of Military Services on July 26, 2004. The Navy received the comments addressed below from RWQCB on July 6, 2004. The Navy received the comments addressed below from the RAB on July 6, 2004.

RESPONSES TO EPA COMMENTS

Global General Comments

1. **Comment:** Under the sections on Storm Sewer Investigations, please include any relevant information on the storm sewer clean out of the lines and sediment removals in the manholes and catch basins performed in 1998. Former Site 18 is being addressed within the context of RI/FS work for all other sites and as such the removal action that has been done on Site 18 in the vicinity of the OU 2B sites must be summarized and any sampling results included.

Response: Information on sampling and cleanout of the storm sewer lines and sediment removal in manholes and catch basins in 1995 to 1997 will be included in the environmental investigations section for each site. Please note that the text will be corrected to include the correct dates for the storm sewer cleanout.

2. **Comment:** The Draft OU-2B Remedial Investigation Report (the RI) indicates that the storm sewer system may be a preferential pathway for the discharge of groundwater contaminant plumes into the Oakland Inner Harbor or the Bay, but it does not appear that the amount of sampling near storm sewers and catch basins is adequate to address potential concerns. In addition, since the storm sewer system was used for industrial waste disposal prior to 1972, it should be

considered as a potential source of contamination, but the RI does not indicate whether sediment has been removed from the storm sewers and catch basins. Please discuss whether potentially-contaminated sediment has been removed from the storm sewers and, if not, why storm sewers are not considered to be a potential source of contamination. Also, discuss whether sufficient sampling has been done to address whether the storm drains are potential pathways for discharge of groundwater contamination into the Oakland Inner Harbor or the San Francisco Bay.

Response:

As stated in general comment number 1 above, information on sampling and clean out of the storm sewer lines and sediment removal in manholes and catch basins between 1995 and 1997 will be included in the environmental investigations section for each site. Phase I of the removal action was conducted by the Navy Public Works Center in 1995 as a CERCLA time-critical removal action. It entailed vacuum-cleaning sediment and debris from storm sewer catch basins and manholes associated with outfalls A, B, E, H, I, J, K, L, and R. Phase 2 of the removal action was completed by 1997 and involved additional cleaning of all manholes and subsystems associated with outfalls Z, AA through KK, and ZZ.

The storm sewers were investigated as a preferential pathway for discharge of groundwater contamination in the "Draft Final Storm Sewer Study Report" (Tetra Tech 2000; the citation is provided below). Three segments of storm sewer line in OU-2B were identified as possibly providing preferential pathways of groundwater contamination to surface water. One of these lines is in Site 4 (and flows to outfall G). It is considered a 'high-priority' line because it intersects a plume with concentrations greater than the screening level, the line is damaged, and likely is submerged. The other two lines are in Sites 4 and 21. They were considered low priority lines because the groundwater concentrations were less than the screening level and the line was not damaged or submerged in groundwater.

Tetra Tech. 2000. "Draft Final Storm Sewer Study Report, Alameda Point." December 4.

3. Comment:

Please include a discussion on whether the high permeability bedding material surrounding the storm sewer lines and utility lines, especially within Site 4, will form a preferential pathway for contaminant flow in groundwater.

Response:

See response to EPA global general comment # 2.

4. Comment: EPA considers oil water separators (OWSs) to be likely, possibly continuing, sources of soil contamination to groundwater. The soil beneath and around OWSs at each site (e.g. OWS 360 at Site 4) needs to be sampled to determine whether or not they are a source.

Response: Further evaluation of the OWSs and RCRA units will be included as an appendix to the draft final RI report. The Navy will investigate any data gaps associated with the OWSs as part of the remedial design or remedial action for the sites.

5. Comment: The report states that data were used only if it reflected current site conditions. What circumstances would allow for data not to reflect current site conditions other than completion of removal actions? Removing data that is "old" disregards the effects and trends of tidal influences, seasonal fluctuations, possible continuing sources, degradation of parent compounds, hydropunch versus monitoring well data and many other useful pieces of information that help to understand the site and estimate the risks. All validated data should be used.

Response: The draft RI report stated, "Soil and groundwater data were collected within and near Sites 3, 4, 11, and 21 through several sampling efforts, and the data were considered to be appropriate for use in the HHRA [human health risk assessment] if they (1) were validated, (2) were not qualified "R", (3) met the DQOs for the RI, and (4) reflected current site conditions. However, the draft final RI was revised to remove item 3. Groundwater data later replaced with more current data, from a particular sample location, were not included in the HHRA because they do not reflect the current conditions at the sites."

All soil and groundwater data were used to evaluate the nature and extent and fate and transport of chemicals that were considered risk drivers in the draft RI unless a removal action occurred or the data were qualified R (rejected). Text will be revised in Section 3.0 of the draft final RI to clarify the use of data.

Based on the conference call with EPA on February 10, 2005, the following criteria will be used to select data for the HHRA included in the draft final RI:

- Inclusion of only the most recent three to four quarters of groundwater monitoring data
- Inclusion of only groundwater data collected within the plume boundary
- Inclusion of field data with a 10 percent laboratory verification and validation

- Exclusion of removed soil
- Inclusion of soil data collected between 0 to 8 feet bgs

6. Comment: **Groundwater must be evaluated for dermal and inhalation exposure pathways for construction workers given both the shallowness of the groundwater and the high concentration levels of the VOCs detected. In addition, the potential for such chemicals as vinyl chloride accumulating in catchbasins and low-lying areas in utility corridors should be evaluated for the construction worker scenario.**

Response: Construction workers would dewater the trench and would not be working within the groundwater. Although construction workers may come in transient contact with groundwater, this exposure was considered insignificant in the draft RI because of the short duration and limited extent expected.

Based on the conference call with EPA on February 10, 2005, the HHRA included in the draft final RI will evaluate the same exposure pathways evaluated in the Site 28 RI report, which included the construction worker inhalation of groundwater exposure pathway.

7. Comment: **The homegrown produce pathway must be evaluated since these sites are slated for future residential use and it is highly likely that gardening, including fruit and vegetable growing, will occur in the soil in these areas. Amending soil with composts and fertilizer does not serve to remediate or eliminate any contaminants present there.**

Response: Future hypothetical ingestion of homegrown produce will be evaluated in the HHRA included in the draft final RI.

8. Comment: **The criterion that data must meet the DQOs for the RI in order to be considered appropriate for use in the risk assessments requires further justification. If samples are analyzed with suitable analytical methods and detection limits, and the data are validated, the data should be included in the risk assessment data set. The use of this criterion apparently resulted in dropping data from the risk assessment that should have been included. Please eliminate the quoted criterion or provide justification for using it; this justification should include a detailed analysis that clearly demonstrates why each sample that is eliminated is unsuitable.**

Response: It is not always appropriate to include all validated data in the risk assessments. As stated in the description of the risk assessment approach, data were included in the draft risk assessment provided they fulfilled certain assumptions on potential exposure to the chemicals present in soil

or groundwater. For example, only data for soil from 0 to 8 feet below ground surface (bgs) were used for the ingestion pathway of the risk assessment. Data from samples collected at depths greater than 8 feet bgs were used in the risk assessment for the inhalation pathway. In addition, a conservative approach was adopted for potential exposure for domestic use of the shallow groundwater aquifer. Only data for samples collected from within the boundary of the plume (defined by the results for samples with non-detected concentrations) were used to develop the exposure point concentration. Results for samples collected outside of the plume with non-detected concentrations were not used, although the data may be validated. Although this approach excluded some validated data from use in the risk assessment, this approach led to a conservative method for evaluating risk from domestic use of groundwater.

9. Comment:

Every chemical detected above background levels or preliminary remediation goals (PRGs) in soil or groundwater should be discussed in the nature and extent section of each site. The discussion of the nature and extent of contamination should be independent of the risk assessment; therefore, chemicals should not be excluded from the nature and extent section because they are believed to not pose risk at the site. It is inappropriate to characterize the nature and extent of contamination based on chemicals that have already undergone a risk assessment and are considered to be risk drivers, particularly since the data used in the risk assessment are only a subset of the validated data considered acceptable for use in the RI. Please revise the nature and extent sections for each site so that they include all chemicals detected above PRGs.

Response:

Every chemical detected above preliminary remediation goals (PRGs) in soil or groundwater will be addressed in the nature and extent section of the draft final RI.

The draft RI used an approach consistent with EPA guidance. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (EPA 2000) and EPA guidance (EPA 1988) state that the RI should discuss the nature and extent of risks posed by hazardous substances. According to the NCP, the lead agency should characterize the nature and threat posed by the hazardous substances and hazardous materials and gather data necessary to assess the extent to which the release poses a threat to human health and the environment (40 *Code of Federal Regulation* [CFR] 300.430 (d)(2)). In developing its guidance for the RI/FS process, EPA (1988) declared that the purpose of the RI/FS process was to characterize the nature and extent of risks posed by uncontrolled hazardous waste sites and to evaluate potential remedial options. It appears that the statute and guidance intended that the RI would identify

the nature and extent of “contamination,” which is defined by the risk assessments.

The nature and extent sections discussed the types and concentrations of all chemicals that are identified as posing significant risk and other chemicals believed to have been used at the sites, even those chemicals detected below PRGs. In evaluating ways to limit the length of the nature and extent discussion so that it would still have a discernable focus on those chemicals that are identified as posing significant risk at each site, the Navy chose to focus on those chemicals that were identified as risk drivers or those chemicals posing significant risk. The industrial nature of these sites precludes a discussion of every chemical detected above PRGs and background because the number of chemicals detected would diminish the reviewer’s ability to identify the chemicals driving risk at the sites. Therefore, the risk assessments were used to focus the discussions towards the chemicals driving risk at the sites because the risk assessment results reflect the best estimate of risk from the current site conditions, which is more appropriate to use than the results of comparisons between site data and PRGs.

See the response to EPA’s general comment 8. In addition, because detection limits greater than PRGs would typically be a concern in a risk assessment, the risk assessments used a statistical technique to derive conservative exposure point concentrations from data that included elevated detection limits. See Appendices E and G for calculation details.

EPA. 1988. “Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA.” EPA/540/G-89/004.

EPA. 2000. “National Oil and Hazardous Substances Pollution Contingency Plan.” *Code of Federal Regulations*, Title 40, Section 300.430 (40 CFR 300.430).

- 10. Comment:** The RI presents a statistical summary of data in which validated data are screened against preliminary remediation goals (PRGs). However, it appears that much of the RI data has not been included in the risk assessment data set. This is confirmed by the fact that often less than 50 percent of the validated samples for the RI were used for the risk assessment as shown in the following table:

Percentage of Validated RI Data included in the Risk Assessment

Analyte	Site 3 Soil	Site 3 Groundwater	Site 4	Site 11	Site 21	OU-Wide
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			Soil	Soil	Soil	Groundwater
VOCs	29.6	11.2	50	15.7	17.4	17.4
SVOCs	32.8	17	79.3	29.7	43.8	53.7
PAHs	100	5	100	96.4	100	314.3
Pesticides	0	100	0	0	54.5	0
PCBs	0	200	0	0	600	0
Metals	60.7	9.0	67	33.9	33.8	22.1
Hexavalent Chromium	-	-	-	-	-	38.1

Based on an evaluation of a few of the chemicals that were detected at Site 4, it is unclear how data were chosen for the risk assessment. It also appears that this has resulted in the exclusion of several contaminants and/or some of the results that represent the maximum detected values from consideration in the risk assessments. For example, Aroclor 1254 was detected above the PRG in 134-SS-001 at 1,300 micrograms per kilogram (ug/kg) but all polychlorinated biphenyl (PCB) and pesticide data was omitted from the risk assessment data set. Similarly, the maximum concentrations of benzo(b)fluoranthene (120,000 ug/kg) and chrysene (130,000 ug/kg) were not used in the risk assessment; the maximum concentrations in the risk assessment data set were 3,100 ug/kg and 2,500 ug/kg, respectively. Please see the attached Excel spreadsheets for a comparison of concentrations used in the Risk Assessment with those used in the RI. It is unclear why validated data are useful for the RI, but not for the risk assessment. The explanation that the DQOs are different is not sufficient, because validated data should be acceptable for quantitative evaluation of risks. In addition, in three cases, more samples were apparently used for the risk assessment than were validated for the RI. Given the disparity between the two data sets, we have little confidence that the risk assessments accurately assess potential health risks associated with these sites. Please either provide a detailed analysis that shows why each sample was or was not included in the risk assessment data set is necessary to demonstrate that the risk assessment data set is representative or revise the risk assessments so that they include some or all of the excluded data.

Response: The human health risk assessment is being revised using new data selection process. As discussed in response to EPA's general comment 8, the only validated data that was excluded from the risk assessment includes:

- Groundwater data that represent samples that were superseded by more recent samples that better represent current site conditions
- Data from soils that had been removed from a site
- Data that were collected simply to characterize conditions within the sewer system or oil-water separators (OWS).

Data from depths greater than 8 feet below ground surface have been included in the human health risk assessment for this draft final RI to evaluate the inhalation pathway. Validated data were limited for some analytical groups, because analyses of soil and groundwater samples typically focused only on contaminants used or previously detected at the site. As explained in the draft RI, the Navy does not perceive this as a data gap; rather this is the result of a biased and phased sampling approach conducted over a period of greater than 10 years with agency oversight and approval. This approach afforded stakeholders opportunities to provide feedback on the suitability or adequacy of the sampling plans, data collected, and the need to collect additional data to identify releases and complete the RI report.

Regarding EPA's comment about specific maximum detected values being excluded from the risk assessments, many of these concentrations were detected in unvalidated samples. For example, Aroclor 1254 was detected at 1,300 micrograms per kilogram ($\mu\text{g/kg}$) in sample 134-SS-001, which was unvalidated. Similarly, the maximum concentrations of benzo(b)fluoranthene (120,000 $\mu\text{g/kg}$) and chrysene (130,000 $\mu\text{g/kg}$) in soil were not used in the risk assessment because the samples were not validated.

As indicated in these examples, the Navy has applied a consistent and rational set of criteria for selecting validated data to be used in the risk assessments. The data used in the draft final risk assessment will better reflect site conditions and the environment for the exposure scenarios evaluated in the RI report.

- 11. Comment:** In many cases the reporting limits (RLs) were significantly above the risk-based screening levels (RBSLs), but this was not considered during preparation of the extent of contamination figures. When the RL is more than 100 times greater than the RBSLs, it is possible that contamination below the RLs was not detected. For example, in groundwater, the maximum detection limits for some SVOCs ranged from 1,000,000 to 2,500,000 $\mu\text{g/L}$ when the PRG was 0.0092 to 1.0 $\mu\text{g/L}$. Significant contamination can be missed when DLs are 4 to

9 orders of magnitude greater than the PRGs. It is understood that this often happens because detection limits (DLs) are elevated when there are high concentrations of other compounds or when there is matrix interference. It is important to understand whether DLs are elevated above RBSLs when reviewing extent of contamination figures. Since all the data is not posted on the contaminant concentration figures, the locations with elevated DLs should be designated in some way, perhaps by using different color symbols. Please indicate locations with elevated DLs on each contaminant concentration figure with a different color symbol.

Response: Elevated detection limits will be more thoroughly addressed in the draft final RI, and data gaps will be identified. Many of the analytical methods that were used over the past 10 years, when much of the samples at these sites were collected, have since been superseded because they were not capable of the detection limits that are needed for comparisons with many of the PRGs established recently. Sampling locations with extremely elevated detection limits will be discussed on a case-by-case basis in the draft final report.

Detection limits for SVOCs were elevated in one groundwater sample, 030-S19-011, ranging from 1,000,000 to 2,500,000 micrograms per liter ($\mu\text{g/L}$). Detection limits for SVOCs in one other groundwater sample ranged from 200 to 500 $\mu\text{g/L}$, while detection limits for the remaining 201 samples analyzed for SVOCs ranged from 50 $\mu\text{g/L}$ or below. Sample 030-S19-011 was collected during a tank removal and contained 2-methylnaphthalene (11,000,000 $\mu\text{g/L}$) and dibenzofuran (460,000 $\mu\text{g/L}$), causing elevated detection limits from matrix interference for the remaining SVOCs.

12. Comment: Please smooth out groundwater and contaminant plume contours.

Response: Groundwater and contaminant plume contours will be smoothed out in areas where elevated detection limits have been used to draw the non-detect lines.

13. Comment: The explosive levels of VOCs encountered at Site 3 during the PAH investigation of October 2003 need to be included and addressed in this report. See the Field Activity Report by Bechtel, dated April 2004 for a summary of the VOC findings at this site.

Response: This information will be summarized under the basewide polynuclear aromatic hydrocarbon investigation conducted in 2003.

14. Comment: Please elaborate on closure requirements for RCRA Part A permitted units. Do the closure plans require clean up of soil and groundwater

or only soil? If groundwater is required to be cleaned up, how will the clean up activities performed pursuant to the permit closure requirements be compatible with the remedial options chosen under the CERCLA Record of Decision? If groundwater contamination from the RCRA permitted units is not addressed under the RCRA closure plans, where is the contamination from these units characterized and dealt with?

Response: The only unit permitted under Resource Conservation and Recovery Act (RCRA) Part A located at OU-2B is industrial wastewater treatment plant (IWTP) 360. A HHRA was completed for this unit. The unit will be assessed for cleanup under the RCRA program. If cleanup is required for IWTP 360, cleanup of sources will be conducted in accordance with RCRA. Groundwater cleanup will be conducted under CERCLA and documented in the feasibility study and closure documents. If land use or institutional controls are required for site closure, they will be put in place under CERCLA and will be documented in the proposed plan and record of decision for OU-2B.

15. Comment: **The existence, or lack thereof, of a seawall at the eastern edge of Seaplane Lagoon should be verified as it may impact remediation decisions for groundwater.**

Response: The seawall is not being considered as a remedial alternative for groundwater contamination at OU-2B. It is highly unlikely that this wall is competent enough to prevent contamination from entering Seaplane Lagoon. Therefore, the Navy assumed that groundwater would be discharged to Seaplane Lagoon as if no wall were present at all. Given this assumption, it is not necessary to know or understand the exact nature, location, or existence of the wall.

16. Comment: **Given the data gaps identified for each site and the difference between the maxima of the RI data set and the maxima of the Risk Assessment data set (see attached Excel spread sheets), the risk assessments are not conservative and it is premature to conclude that no further action is necessary for soil at Sites 4, 11, and 21. Please delete this recommendation from the Executive Summary and from the respective subsections in Section 10.**

Response: The no further action recommendation will be removed from the text for soil at Sites 4, 11, and 21, and all sites with a carcinogenic risk above $1E-06$ or a noncancer hazard index (HI) above 1 will be addressed in the FS. There have been several data gaps identified for the remedial investigation report that lead to uncertainty in the risk assessment. However, the risk assessment is by design a conservative estimate and

sufficient sampling has been conducted to evaluate the likely sources of contamination at each site. The data gaps that have been identified relate more to specific features or sources and do not reflect widespread contamination that would require a significant remedial action for soil. The FS report may include a risk management decision for no further action if human health risk estimates for chemicals related to site activity are within the risk management range. This decision is consistent with EPA guidance (EPA 1991), which recommends, "where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than $1E-04$ and the non-carcinogenic hazard index [HI] is less than 1, action generally is not warranted unless there are adverse environmental impacts."

EPA. 1991. "Memorandum Regarding the Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions." OSWER 9355.0-30. April 22.

17. Comment: **The report contains a good summary of the Existing Uses of Groundwater. In addition, the use of EPA's Wellhead Protection Area model to determine the effect of off-base pumping on groundwater contaminant migration was very useful.**

Response: Comment noted.

Global Specific Comments

1. Comment: **Executive Summary, OU-wide Groundwater Plume, Page ES-10 and ES-11: Please provide more detail regarding the detection of methylene chloride in blank samples compared to the detection of methylene chloride in groundwater samples. This discussion is necessary to determine whether methylene chloride is a contaminant related to site activities or a laboratory contaminant. Also, please explain how the risk assessment accurately assesses risk caused by methylene chloride if only one of the 31 detections was used in the risk assessment.**

Response: The level of detail noted by the comment is no longer contained in the executive summary. The requested discussion about methylene chloride and its detection in groundwater samples is now in Section 9. Section 9 includes the following text, "Although methylene chloride was detected in 31 samples, 30 of these samples were collected to support the chemical oxidation removal action. Data from this removal action were not fully validated and 20 of the 30 samples with detected values were only laboratory qualified with a "B" qualifier. This means the blanks were contaminated.

Because of concerns with data quality, the data collected from this investigation was not used in the risk assessment. It should be noted that of these samples with detected concentrations, the four highest concentrations ranged from 5 to 6 µg/L, which is just above the risk-based screening level of 4.3 µg/L.

Methylene chloride was detected in only 1 of the 424 OU-2B groundwater samples used in the risk assessments. This concentration of 75 µg/L, also the maximum concentration detected at the site, was collected in 2002 from location M03-11 to the east of the OU-2B boundary. This one sample that exceeded the screening level, with a concentration of 75 µg/L, was collected in 2002 from a location east of the boundary of OU-2B (M11-03). Samples collected at this well before and after this sample contained non-detected concentrations with detection limits of 5 and 18 µg/L. Data indicate that methylene chloride is attributed to laboratory contamination and not activities at Building 360.”

The additional information will also be incorporated into the discussion of methylene chloride in Section 9.2.1.

The Navy believes the risk from methylene chloride was adequately assessed in the risk assessment because all available validated data were included and are distributed evenly across the site. Furthermore, the one detected result appears to be anomalous, from a sample that was collected from a monitoring well upgradient and more than 200 feet from Building 360 where it was used; in addition, no other contamination was detected at this location. This result was conservatively carried through the risk assessment because methylene chloride was used at the site.

- 2. Comment:** **Executive Summary, Recommendations, Page ES-13: The statement regarding risk posed to terrestrial ecological receptors is inappropriate. Chemicals were identified that pose a risk to ecological receptors; it is inappropriate to recommend no further action for these chemicals based on the assumption that the risks identified for ecological receptors are overestimated. Please delete this statement and ensure that chemicals that pose a risk to ecological receptors are recommended for further action.**

Response: The recommendations will be revised to state, “Although chemicals were identified that could pose a risk to terrestrial ecological receptors, ecological habitat capable of supporting significant wildlife is not present. Therefore, there is little likelihood the site will be used for ecological habitat. Consequently, the risks identified for ecological receptors are overestimated.”

3. Comment: Section 3.5, Data Evaluation Methods, Page 3-13: According to this section, the objectives of the nature and extent evaluations are to “(1) present the concentrations of chemicals believed to be used at the site, and (2) provide detailed evaluations of those chemicals that demonstrate significant risk to human health or the environment (risk drivers).” The nature and extent evaluation should present the concentrations of all chemicals detected above PRGs or background at the site since it is not possible to know with certainty every chemical that was used at a site over time. Furthermore, detailed evaluations should be provided for each chemical detected above PRGs or background; the nature and extent evaluation should be conducted independently of the risk assessment and should therefore not provide detailed evaluations only for chemicals determined to be risk drivers. Likewise, the fate and transport evaluations should not limit the discussion to chemicals deemed “risk drivers”; instead, these evaluations should discuss all chemicals detected above PRGs or background. These same issues need to be addressed in Section 3.5.3 (Nature and Extent Approach), 3.5.4 (Fate and Transport Approach), and in the “Nature and Extent” and “Fate and Transport” sections for each site.

Response: See the response to EPA global general comment #9.

4. Comment: Section 3.5.3, Nature and Extent Approach, Page 3-17: The last sentence in this section states that for metals, screening levels are based on the maximum concentration detected in ambient soil or groundwater. Some maximum concentrations could be anomalous and not representative of ambient concentrations, if outliers were not removed from the data set. Please clarify whether outliers were removed from the ambient data set and if not, explain whether using the maximum concentrations could result in inappropriately high screening levels and the implications if this occurs.

Response: Screening levels for metals, as described in the approach section of the RI report, are used only as a point of reference for the evaluation of the nature and extent and should not be confused with the background comparison. The background comparison (as described in Section 3.5.2 of the RI report and in Appendix E) is a statistical comparison of data sets and is not based on a threshold value.

5. Comment: Section 3.5.5, Human Health Risk Assessment Approach, Page 3-18: This section states that “some alternate agency risk assessment methods were used in lieu of or in addition to the parallel EPA method” but only mentions the use of DTSC’s lead risk model, LeadSpread 7. If additional alternate agency risk assessment methods were used, please discuss the specific methods in the text and

explain why they were used in lieu of or in addition of the parallel EPA method.

Response: No other alternate risk assessment methods were used. The text will be revised to state, "Lead was evaluated using the DTSC lead risk model, LeadSpread 7 (DTSC 2003), in lieu of the EPA method. Therefore, if site concentrations exceeded the California modified (Cal-modified) residential PRG (EPA 2002), the DTSC lead risk model, LeadSpread 7 (DTSC 2003), was used to assess lead health risks for children."

6. Comment: Section 3.5.5.2, Identification of Chemicals of Potential Concern, Page 3-20: According to the text, analytes detected in less than 5 percent of samples were excluded as contaminants of potential concern (COPCs) because chemicals detected infrequently may be sampling and analytical artifacts or spurious data. However, infrequent detection may indicate the presence of a hot spot, and additional sampling would be required to determine the extent of contamination. It could also be due to detection limits that are set well above the PRGs. Please explain how the Navy will ensure that hot spots and other possible contaminant areas are adequately addressed when these results were deleted from the risk assessment data set.

Response: The risk assessment will be revised to include all detected chemicals regardless of frequency of detection. This will ensure that any chemical that may be present in a hotspot has been evaluated in the risk assessment.

See the response to EPA global general comment #11 on detection limits.

7. Comment: Section 3.5.5.3, Exposure Assessment, Pages 3-22 and 3-23: Construction worker exposure via inhalation and dermal contact should be evaluated based on the high concentration levels of VOCs encountered in the groundwater. Homegrown produce must also be included in the risk assessment as these sites are designated as future residential.

Response: See the response to EPA global general comment #6 on construction worker exposure and to EPA general comment 7 for homegrown produce.

8. Comment: Section 3.5.5.3, Exposure Assessment, Page 3-22: The text in the last paragraph on page 3-22 states that the commercial/industrial worker and recreational receptors were evaluated for exposure to surface soil (0 to 2 feet bgs), but on the previous page the text states that the recreational exposure scenario was not evaluated because each site was evaluated for exposure scenarios that were more protective to

human health than the recreational exposure scenario. Please resolve this discrepancy.

Response: The statement, "The recreational exposure scenario was not evaluated because each site was evaluated for exposure scenarios that were more protective to human health than the recreational exposure scenario," is correct. The words "and recreational receptor" will be deleted from this text.

9. Comment: Section 4.2.2.1, Groundwater Flow in the FWBZ, Page 4-4: Groundwater elevation data collected over a period of three weeks (as was the case in June 2002) should not be used to construct groundwater elevation contours (Figure 4-11) and make conclusions regarding groundwater flow. This data cannot easily be corrected for tidal influence and used to construct meaningful maps because there may be other factors that influence the groundwater elevations in site wells when measurements are collected over an extended period of time. Please remove Figure 4-11 from the RI or explain why this data should be considered acceptable. Also, please explain why the data was not collected over a shorter time period.

Response: The Navy agrees that the groundwater flow maps should not be based on data collected over a three-week time period. Figure 4-11 will be removed.

10. Comment: Section 4.2.2.1, Groundwater Flow in the FWBZ, Page 4-4: According to the text, since the 2002 groundwater elevation data were not collected synchronously, they are considered to be approximate and therefore were interpreted without making corrections for tidal influence. It is unclear why the September 2002 data, which was collected over a 1.5 hour period, is not considered to have been collected synchronously, and why it was therefore interpreted without making corrections for tidal influence. Furthermore, it is unclear why the April 2003 data was not tidally corrected. The text states that this data was collected in a short enough time period (6 hours) that the tidal influence should be minimal. These statements contradict each other, since data collected over 1.5 hours should be acceptable if data collected over 6 hours is acceptable. Please clarify when tidal correction is appropriate and revise the text so that data collected over short periods of time is treated consistently.

Response: Depth to water measurements collected in June 2002, September 2002, and April 2003 were not tidally corrected. The data collected in June 2002 were not tidally corrected because the period of collection was long. Data in September 2002 and April 2003 were collected within 1.5 hours and within 6 hours, respectively. These data were collected over a short

enough time that tidal correction is not needed. Figure 4-11, containing the June 2002 data, will be removed and the text in the draft final RI will be corrected as appropriate.

11. Comment: **Figure 4-2, Geological Cross Section A-A', Site 3: The horizontal line bisecting lithology in the MW97-2 boring is not defined. The line, which was drawn at approximately 5 ft msl, does not appear in the boring log. Please either define it or remove it.**

Response: The horizontal line that bisects the lithology in boring MW97-2 on Figure 4-2 will be removed in the draft final RI

12. Comment: **Figure 4-2, Geological Cross Section A-A', Site 3: The lithology at boring D03-01 is not depicted accurately on Figure 4-2. The cross section indicates that from 5-8 feet below ground surface (ft bgs), a layer of well graded sands exists (SW). However, the boring log shows that the lithology from 5-8 ft bgs is SW/SC. In addition, a lens of clayey sand (SC) exists at 11 ft bgs, but this lens is not included in the figure. Please revise Figure 4-2 appropriately.**

Response: The lithology at boring D03-01 in Figure 4-2 will be revised as appropriate.

13. Comment: **Figure 4-3, Geological Cross Section B-B', Site 3: The boring log for soil boring S04-DGS-DP01 indicates that clayey sand (SC) was observed between 10 and 23 ft bgs, but, this depth interval is shown as silty sands (SM) on the figure. Please ensure that the boring logs and cross sections are consistent.**

Response: The silty sands (SM) depicted on the figure from 10 to 23 feet will be revised to reflect clayey sand (SC), as shown on the boring log.

14. Comment: **Figure 4-4, Geological Cross-Section A-A', Site 4: This cross-section does not provide information to evaluate potential contaminant migration. It is not possible to connect the stratigraphy across the figure because most wells are shallow. As a result, it appears that logging was done inconsistently or that the lithologic information is inadequate. Please consider selecting a different line of section to provide information.**

Response: The Navy agrees that the amount of available data is inadequate to define the lithology below Building 360 at Site 4. Data for groundwater are adequate to characterize the nature and extent of contamination below Building 360. General assumptions can be made regarding the lithology and contaminant transport below Building 360 based on the lithology located at greater depth across most of OU-2B. More precise information

on lithology will be imperative to design and implement an effective treatment system. Therefore, it was assumed that more information would be collected during the remedial design phase of the Navy's response to this site.

- 15. Comment:** Figure 4-4, Geological Cross-Section A-A', Site 4: The lithology of S04-DGS-DP21 as shown in the cross-section does not match the boring log. There is a large discrepancy in the representation of the surface layer as well as confusion about the difference between sorting and grading. A well-sorted sand is a poorly graded sand, while a poorly sorted sandy gravel is a well-graded gravel. Please correct these errors in the cross-section.

Response: The discrepancies in Figure 4-4 will be corrected.

- 16. Comment:** Figure 4-13, Groundwater Level Elevations Without Tidal Corrections, April 2003: The sharp curves in the groundwater contour lines near wells MW360-2, MWD13-3, M03-05, and MW97-3 probably do not accurately represent site conditions. Groundwater tends to assume the flattest possible surface and the contours should reflect this. It is unclear why these wells, particularly MW360-2, were not drawn with isolated contours like other wells on this figure (e.g. 372-MW1 and M11-04). Please revise this figure to isolate abrupt changes in groundwater elevation within separate contours.

Response: The contours represented in the figure represent the data as measured at each well. Given the groundwater measurements in surrounding wells, it appears that MW360-2 may represent a groundwater anomaly. No change in the figure is warranted.

- 17. Comment:** Figure 4-15, Potentiometric Surface Map, Second Water Bearing Zone, April 2003: Well D04-03, with a groundwater elevation of 5.5 ft MLLW, is located between the 5.9 and 6.0 contour lines. Please revise the contours to reflect this groundwater elevation.

Response: The map will be revised such that the 5.9 contour line is removed from the figure as appropriate.

Site 3 General Comments

- 1. Comment:** Structure 175 (transformer house) is identified in Section 5.4.1 as a potential source of PCB contamination, but according to Figure 5-5, no samples were collected in the vicinity of Structure 175 during the EBS investigations. Since soil samples were not collected as part of CERCLA investigations, PCB analyses were not done and the extent

of PCB contamination in the vicinity of Structure 175 has not been adequately characterized. Please discuss how this data gap will be addressed.

Response: In early 1999, Supervisor of Shipbuilding Portsmouth Environmental Detachment at Mare Island conducted a PCB survey and sampling of electrical equipment at Alameda Point. More than 158 items (Units) of oil-filled equipment were sampled, and updated lists of analytical results of PCB-contaminated electrical equipment and recommendations for eliminating PCBs from Alameda Point were prepared. Subsequently, the Navy conducted removal actions for those transformers and switches that were contaminated with PCBs. The results are documented in a report, "Final PCB Report, Alameda Point, Alameda, California," dated May 2002. Based on the results presented in the report, the Navy did not find any PCB contamination in transformers at Structure 175 that warranted further action. This information will be provided in Section 3.0 and in site-specific sections of the draft final RI report. In addition, Structure 175 will be removed as a potential source of PCBs in the site conceptual site model.

2. Comment: **The extent of lead contamination in soil has not been determined in the vicinity of 129-001-002 and M03-07. Delineation was done to the north and south of these locations but not to the east or west. Please discuss how this data gap will be addressed.**

Response: Lead in soil east and west of sampling location 129-001-002 and M03-07 will be identified as a data gap in the draft final RI and will be recommended for further evaluation in the FS.

3. Comment: **The text states that the vertical extent of elevated lead in the Site 3 groundwater plume is unknown. In addition, the extent of lead in groundwater has not been determined in the vicinity of CA03-02 and M03-07, north and east of M03-04, west of S03-DGSDP31 and S03DGS-DP14, and south and southwest of of S03-DGS-DP17. These are data gaps. Please discuss how the horizontal and vertical extent of lead in groundwater will be determined.**

Response: Figure 5-11 is incorrect. An inappropriate screening level was used such that lead in groundwater was identified at more locations than was appropriate. A new map will be included in the draft final RI with a screening level of 28.4 µg/L. Based on this information, the only groundwater sampling location where results exceed this criterion is the plume in the northern portion of the site and at well M03-04. Well M03-04 has been sampled 10 times from 1994 to 2002. The concentration of lead in groundwater has exceeded the screening criterion only twice, once in June 1995 at a concentration of 30.9 µg/L, and once in

June 2002 at a concentration of 58 µg/L. There appears to be a decreasing trend during the summer. Elevated levels of lead were not detected in soil located at well M04-03; however, there is a large plume of free product petroleum near Former Structure 430. It is possible that this plume of petroleum hydrocarbons may be influencing concentrations of lead in groundwater at well M04-03. Lead in groundwater at well M04-03 will be identified as a data gap and will be recommended for further evaluation in the FS.

- 4. Comment:** **The sediment data in Appendix D is not discussed. Please include a discussion of the sediment data in the text.**

Response: The sediment data included in Appendix D were primarily collected from storm drains and catch basins during the storm sewer investigation, as stated above. This information will be included and discussed in the text as appropriate.

Site 3 Specific Comments

- 1. Comment:** **Section 5.1.1, History, Page 5-2: Historically, GAP 10 was used to store solvents, waste oils, and asbestos. Please discuss whether the presence of asbestos-related contaminants was investigated in the vicinity of GAP 10.**

Response: All RCRA units, including GAP 10, will be evaluated in a separate appendix that will be attached to and reference in the RI text.

- 2. Comment:** **Section 5.1.1, History, Page 5-3: It is unknown whether the transformers located east and west of Building 337 contained PCBs. However, it does not appear that any soil samples in the vicinity of Building 337 were analyzed for PCBs during the EBS or CERCLA investigations. This represents a data gap that needs to be addressed.**

Response: See the response to Site 3 general comment number 1.

- 3. Comment:** **Section 5.1.1, History, Page 5-4: Heavy staining is visible near Former Building 109 and Former Structure 430 in aerial photographs from 1975. The fate of this heavily stained soil is unclear. Please discuss whether there was a known soil removal action, whether these areas are still stained, or any other information regarding these heavily stained areas.**

Response: The heavy staining located near Former Building 109 and Former Structure 430 is no longer present at the site. No removal action is known to have occurred at this site. It is likely that the soil or concrete weathered

and the staining gradually dissipated from the surface once fueling operations were discontinued sometime prior to 1988, which is about when the buildings are no longer seen in aerial photographs.

Located below the area of former heavy staining, there is a large plume of petroleum hydrocarbons that is commingled with other VOCs. This plume will be recommended for further evaluation in the FS. The possibility of contaminated soil at this location will be considered in the FS.

- 4. Comment:** **Section 5.1.1, History, Page 5-5: In the storm sewer discussion, a few sewer lines are described as having "significant sag." Please discuss these sags in greater detail, including a more detailed description of their magnitude and the implications of the sags.**

Response: Significant sags were observed along at least one segment of storm sewer line at Sites 3, 4, and 11. The sags indicate areas where the storm sewer appears to have settled. They do not necessarily indicate breaks in the line where groundwater could infiltrate into the storm sewer. The significance of sags will be discussed on a site-specific basis.

- 5. Comment:** **Section 5.2.1, Comprehensive Environmental Response, Compensation, and Liability Act Investigations, Page 5-7: During the 1994 Follow-on Investigation, five shallow monitoring wells (M03-04 through M03-08) were installed to further characterize the extent of TPH in the SWBZ, but wells M03-05 and M03-06 were not included in the groundwater summary in Table 5-2 or on Figure 5-3 because these points are no longer within the Site 3 boundary, which has changed since this investigation. However, if these points are useful in delineating the extent of TPH contamination, please include them on Figure 5-3.**

Response: Section 5.0 presents information on Site 3, including soil contamination and the discrete plume of lead in groundwater in the northern portion of Site 3. Section 9.0 presents information associated with the OU-wide groundwater plume. Therefore, TPH contamination in groundwater will be discussed in Section 9.0 of the draft final RI. All groundwater sampling locations, including monitoring wells M03-04 through M03-08, are included on figures in that section and will be included on the TPH figure that will be developed for Section 9.0.

- 6. Comment:** **Section 5.3.1, Soil, Page 5-12: Please provide more detail regarding the pesticide and PCB data collected under the EBS investigations, including the number of samples analyzed for PCBs and pesticides, the number of detections, the maximum concentration detected, and the number of PRG exceedances. Since both pesticides and PCBs**

were used at the site and no soil samples that were collected as part of CERCLA investigations were analyzed for pesticides or PCBs, a more in-depth discussion of the findings and extent of the EBS investigations is necessary.

Response: Figures that present the sampling locations for soil and groundwater by analytical group, including pesticides and PCBs, will be added to the draft final RI report; however, chemical concentrations and screening criteria will not be posted on the figures. The text in the draft RI that states no PCB or pesticide samples were collected during CERCLA investigations is in error. The draft final RI will be revised to include results from each investigation.

7. Comment: Section 5.3.3, Groundwater, Page 5-13: This section states that for the lead groundwater plume, analytical results from 16 direct push groundwater samples collected during the Data Gap investigation from 2001 to 2002 were selected as the subset of groundwater data for use in the risk assessments. It is unclear why only a subset of data was used in the risk assessment and how this subset was selected.

Response: Data used in the risk assessments were aggregated based on exposure area. The exposure area for groundwater was based on the size of the plume; therefore, data for groundwater were aggregated by contaminant plume. Because the plume of lead in the northern portion of Site 3 was discrete (in other words, it is not commingled with other constituents), the data in this area were aggregated separately. Only data from within the plume were considered appropriate for evaluating risk. This provided a conservative bias to calculation of the exposure point concentration. This information will be included in Section 5.3 of the draft final RI report.

8. Comment: Section 5.4.2, Background, Page 5-15: The background comparison was conducted by comparing a background data set with analytical results for metals in samples representative of the site, but it is not clear why this was not done for lead in the groundwater plume. The background data set should be compared to all analytical results for metals at the site.

Response: The text included on page 5-15 that states, "A background comparison also was conducted for the OU-wide groundwater plume (See Section 9.2.2) but not for the lead in groundwater plume at Site 3," is incorrect. The background data set for groundwater was compared to all validated OU-2B groundwater data for metals, including data from within the OU-wide groundwater plume and the discrete plume of lead. The text on page 5-15 will be revised to state, "A background comparison also was conducted for groundwater at OU-2B that included data from the OU-

wide groundwater plume and the discrete plume of lead in groundwater at Site 3." Section 9.2.2 will also be updated as appropriate.

- 9. Comment:** Section 5.4.3, Nature and Extent, Page 5-17: The table entitled "Soil Analytical Results for Chemicals Believed to Have Been Used At Site 3" should include all chemicals detected above PRGs. As presented, this table does not include all of the chemicals known to have been used at the site, for example, building 112 was used as a zinc smelter, but zinc is not included. It is unclear why only Aroclor 1260 was included, since it is unlikely that this is the only Aroclor used in transformers, cutting oils, etc. Given the unknown chemical uses at several former buildings and the difficulty in constructing a complete and accurate site history, it is impossible to know every chemical that was used at a site. Every chemical detected above PRGs should be included in the table and discussed in both the nature and extent of contamination section and in the fate and transport section.

Response: Every chemical analyzed for in soil or groundwater is presented in the statistical summary tables presented previously in this section, and these statistical summary tables present the information requested by EPA. The table referred to by EPA is only a subset of data previously presented in the report.

Zinc was included on Figure 5-3 and the text on zinc was improperly placed into Section 6.4.3.1 of the draft report. The following text will be removed from Section 6 and inserted in Section 5: "Although a zinc smelter was reported to have operated in Building 112, the maximum concentration of zinc was detected in a soil sample collected from well M03-07, located along the eastern edge of the site (Figure 6-3). Concentrations of zinc in soil samples collected around Building 112 ranged from 18.2 to 118 mg/kg [milligrams per kilogram]." In addition, zinc will be removed from the table, "Soil Analytical Results for Chemicals Believed to Have Been Used at Site 4," and will be included in the table, "Soil Analytical Results for Chemicals Believed to Have Been Used at Site 3."

Aroclor 1260 was included in the table because PCBs were used at the site in Structure 175, the transformer house. Only Aroclor 1260 was included because it was the only PCB detected in soil at the site. Furthermore, the purpose of the sections on the nature and extent was to discuss the types and concentrations of all chemicals believed to have been used at the sites, even the chemicals detected below PRGs; the risk assessments are used to focus more detailed discussions. The Navy believes that it is more appropriate to use the results of the risk assessment rather than a comparison of all site data against PRGs to focus discussions of the nature and extent of contamination.

10. Comment: Section 5.4.3.2, Risk Drivers, Arsenic in Soil, Page 5-19: The potential that the Garden Shop may have been a source of arsenic was not recognized in the text. The fact that the highest concentration of arsenic was detected in the vicinity of Building 512B/222, Garden Shop, and Building 517, former garden shop, is significant because arsenic trioxide was a common insecticide.

Response: Arsenic trioxide could have been sold in the Garden Shop; however, arsenic trioxide would not have been made or mixed on the site. Arsenic concentrations in soil at the site are slightly greater than background; thus, these concentrations do not indicate levels that would exist if arsenic trioxide were spilled or disposed of at the site.

11. Comment: Section 5.4.3.2, Risk Drivers, Polynuclear Aromatic Hydrocarbons in Soil, Page 5-19: It is unclear if there were PAH detections during previous investigations because it appears that the only data discussed in this section and presented on Figure 5-10 is from the 2003 Basewide PAH Investigation. Tables D-2 and D-12 indicate that there were PAH detections during earlier investigations. Please discuss PAH detections during earlier investigations and incorporate this data on Figure 5-10.

Response: The objective of the 2003 PAH investigation was to collect data for soils that would replace older data, which could not adequately assess PAHs associated with background. These older data could not be used because sampling techniques were questionable and detection limits were elevated. Therefore, only the new PAH data were used to evaluate risk from PAHs in the RI report.

Section 3.4.3 of the Draft RI report states, "Because some historical soil data for PAHs at Alameda Point have elevated detection limits, additional PAH sampling of the CERCLA sites was conducted in 2003 (Bechtel 2003). These PAH data achieved detection limits below Region 9 preliminary remediation goals [PRG], so the PAH data are of sufficient quality to characterize the sites and conduct risk assessments. Only PAH data from the 2003 sampling event, rather than historic data, are evaluated in the RI." The last sentence of this statement will be changed to state, "Only PAH data from the 2003 sampling event were evaluated in the RI because older data had elevated detection limits."

12. Comment: Section 5.4.3.2, Risk Drivers, Lead in Groundwater, Page 5-20: The text does not indicate whether the storm sewer system is believed to be the potential source of lead contamination in groundwater or whether the storm sewers potentially transport lead contamination off-site.

Please discuss the significance of the storm sewer line within the lead groundwater plume at Site 3.

Response: The significance of the storm sewer line with regard to the lead plume and potential for off-site lead transport will be addressed.

13. Comment: Section 5.4.4.2, Lead in Soil, Page 5-21: The text in this section states that it is unlikely that lead in soil will migrate to groundwater due to the geochemical conditions at Site 3. However, there are elevated lead concentrations in soil directly above the groundwater plume, so it is likely that lead in soil migrated to groundwater in the past. Please clarify.

Response: The text will be revised to state, "The geochemical conditions at Site 3 will tend to stabilize lead in soil, reducing the amount of available lead that could migrate to groundwater."

14. Comment: Section 5.4.4.3, Polynuclear Aromatic Hydrocarbons in Soil, Page 5-21: The text states that PAHs have a low potential for migration and will likely remain in their present locations, but these statements do not take the presence of solvents and fuels into account. In the presence of fuels and some solvents, PAHs are more soluble and can migrate to and with groundwater. Please revise the text to incorporate this information.

Response: The following text will be added: "PAHs are not subject to degradation processes and bind to organic matter in soil. PAHs in soil are mostly insoluble in water and exhibit low potential for migration, but can become mobile in the presence of petroleum hydrocarbons."

15. Comment: Figure 5-2, Condition of Storm Sewers at Site 3: Aside from two labels on the figure that indicate "Sound Condition" and two labels that indicate "Condition Unknown," the condition of storm sewers cannot be determined by looking at this figure. Please revise Figure 5-2 so that the extent of storm sewer lines with cracks and significant observed groundwater infiltration and the lines with no cracks or significant observed groundwater infiltration are clearly marked.

Response: Relevant information on cracks and significant observed groundwater infiltration will be added to Figure 5-2.

Site 4 General Comments

1. Comment: The text on Page 6-13 states that wipe and scrape samples were collected in the plating shop, but the analytical results from these

samples are not discussed in the text. Similarly, the results from sludge and sediment samples are not discussed in the text. Please discuss the results of wipe, sludge, and sediment samples and provide a figure showing the location of these samples.

Response: The results of wipe and scrape samples collected within the plating shop will be discussed in further detail in the report. Samples collected after the removal action conducted below the plating shop in Building 360 will be displayed on a figure and incorporated into the report. With regard to sludge and sediment samples, please see the response to EPA global general comment 1.

2. Comment: The extent of sampling in the vicinity of the locations with the maximum concentrations of various analytes in soil was inadequate. For example, the maximum concentrations for eight chemicals are located in the eastern portion of the site (east of Building 360). Figures 6-3 (Site 4 Sampling Locations for the CERCLA and TPH Investigations) and 6-6 (Site 4 Sampling Locations for the EBS Investigations) show that sampling was relatively sparse in this area relative to the rest of Site 4. It appears that the extent of contamination in the vicinity of the maxima east of Building 360 has not been determined. This is a data gap and additional sampling should be done east of Building 360 to determine the extent of soil contamination.

Response: Based on information included in the comment above, it appears that EPA's concern is based solely on the number of samples shown on Figures 6-3 and 6-6 and does not take into account concentrations of chemicals found in samples; site use, including chemicals used at the site; and where various chemicals were used at the site.

Figure 6-8 shows the locations of the maximum detected concentration of chemicals used at the site. The chemicals shown on this figure are independent of chemicals considered to pose risk, although some of the chemicals used at the site pose risk to human health or the environment. All chemicals shown on Figure 6-8 east of Building 360 are present at concentrations well below PRGs. Furthermore, as stated on page 6-10, the area east of Building 360 was used for barracks until the early to mid-1970s, when most the barracks were removed when new enlisted housing was built in other parts of the base. A few structures remained west of Building 360 in the 1975 aerial photograph (Pacific Aerial Survey, various years). All buildings had been removed east of Building 360 in the 1988 aerial photograph (Pacific Aerial Survey, various years), and the area is now an open grassy field used for soccer.

3. Comment: The extent of copper and cadmium contamination beneath Building 360 has not been defined. The maximum concentrations were detected in B04-41, but there are no samples to the east or west of this location to delineate the extent of contamination. In addition, it does not appear that any samples were analyzed for copper or cadmium beneath the southern and east central portions of Building 360. Please discuss how these data gaps will be addressed.

Response: Samples were collected and analyzed for cadmium and copper below the portions of the building most likely to be affected by activities in the building. Copper was not present in any sample collected at the site at a concentration above the PRG, does not pose risk to human health, and poses minimal risk to ecological receptors. Cadmium was found in one sample at a concentration above the PRG, does not pose risk to human health, and poses minimal risk to ecological receptors. Because samples collected below the portions of the building most likely to be contaminated did not contain elevated levels of copper and cadmium, it is highly unlikely that the remainder of the building contains elevated levels of these compounds. The Navy believes adequate sampling has been conducted below the building to adequately assess risk. As such, the Navy does not perceive the lack of soil sampling below the southeastern and central portion of the building as a data gap.

4. Comment: Similarly, the extent of silver beneath Building 360 has not been defined. The majority of samples were collected in the west central portion of the building beneath the plating shop area, but it is possible that there is silver contamination in other areas since silver was also detected in B04-41 in the north. The extent of silver contamination east and west of B04-41 has not been determined. Please discuss how these data gaps will be addressed.

Response: Samples were collected and analyzed for silver below the portions of the building most likely to be contaminated by activities in the building. Silver was not present in any sample collected at the site at a concentration above the PRG, does not pose risk to human health, and poses minimal risk to ecological receptors. Because samples collected below the portions of the building most likely to be contaminated did not contain elevated levels of silver, it is highly unlikely that the remainder of the building contains elevated levels of silver. The Navy believes adequate sampling has been conducted below the building to adequately assess risk and does not perceive the lack of soil sampling below the southeastern and central portion of the building as a data gap.

Site 4 Specific Comments

1. Comment: Section 6.1.1, History, Page 6-2 and Figure 6-1, Site 4 Features: The text states that OWS-414 was associated with Building 414, but this OWS is missing from Figure 6-1. Also, the text states that OWS-360 was located on the northwestern side of Building 360, but Figure 6-1 shows OWS-360 on the northeastern side of the building. Please include OWS-414 on Figure 1 and resolve the discrepancy in the location of OWS-360.

Response: Page 6-9 of the text states that "OWS-414 was located on the west side of Building 414 at the washdown area; however, the exact location of these features is unknown and no other details are available (ERM-West 1994)." In addition, Figure 6-1 states in the Notes section of the legend that OWS-414 could not be located and is not included on the figure. OWS-360 is correctly located on the figure. The text on page 6-2 will be corrected to state, "OWS-360 was associated with Building 360 and was located on the northeastern side of the building."

2. Comment: Section 6.1.1, History, Open Space, Page 6-10: The text describes areas in the northern portion of Site 4 that were used for drum storage or that had Aboveground Storage Tanks (ASTs) but the location of these features is not shown on any of the figures. Given the fact that the source of the dense nonaqueous phase liquid (DNAPL) plume appears to be in this area, it is important to include features like drum storage areas on a map. If this is not possible, aerial photographs showing the drum storage area should be provided. This information should also be used in the conceptual site model. Please include the location of the drum storage area and ASTs on a figure or include the relevant aerial photograph(s). Also, please depict any other observed features north and northwest of Building 360.

Response: Aerial photographs will be included as an appendix to the report. As stated on page 6-10 in the RI report, no information is available on the materials stored in these tanks. With regard to incorporating this information into the site conceptual model, no drums were stored in the area where the highest concentrations of trichloroethene (TCE) are located, based on aerial photographs. An old railroad track ran through the site directly over the location of the highest concentrations. This information, including the location of the railroad, will be incorporated into the site conceptual model on pages 6-22 and 6-23.

3. Comment: Section 6.2.1, Follow-on Investigation, 1994, Page 6-13 and 6-14: Identification numbers for the CPT points discussed at the beginning of the second paragraph are not specified. Please revise the text to include the identifiers of these CPT locations.

Response: The missing points include CPT-S04-01 through CPT-S04-04. This information will be added to the text on page 6-13.

- 4. Comment:** Section 6.2.1, Geochemical Profiling to Define Chlorinated Solvent Plumes, 1997, Pages 6-14 and Section 6.2.1, Follow-On Investigation, 1998, Page 6-15: The text states that geochemical profiling samples were collected along eight transect lines and references Figure 6-3, but this figure contains so many data points that the transects cannot be distinguished. Further, the locations of the discrete groundwater samples from the follow-on investigation are not obvious on Figure 6-3. Also, the identifiers of these sample locations are not specified in the text. Please provide a separate figure that shows the transect lines and include the sample identifiers in the text.

Response: The identifiers will be included in the text. In addition, the investigations included on Figure 6-3 will be broken out into three figures.

- 5. Comment:** Section 6.3.1, Soil, Page 6-21: It is unclear why soil samples collected as a part of CERCLA investigations were not analyzed for pesticides and PCBs, when the pesticide and PCB data collected under the Environmental Baseline Survey (EBS) investigations were of poor quality. It is inconsistent to say that a data gap does not exist "because pesticides were detected at low concentrations during the EBS sampling" and to say that the data was of insufficient quality for the human health risk assessment (HHRA). The extent of pesticide and PCB contamination is a data gap and additional sampling should be performed in order to determine the extent of pesticide/PCB contamination at the site. Please discuss how this data gap will be addressed.

Response: See the response to EPA general comment 2. The RI did not state that the EBS data are of poor quality. In addition, Table 6-3 shows that between 21 and 35 soil samples were collected and analyzed for pesticides and PCBs. Of these, only Aroclor 1254 was detected above its PRG in one sample, at a concentration of 1,300 micrograms per kilogram ($\mu\text{g/kg}$). Thus, samples were collected and because there was no indication of a problem, no additional samples were judged necessary for the CERCLA investigation. The Navy does not believe that pesticides and PCBs need be investigated further at Site 4.

- 6. Comment:** Section 6.4.3, Nature and Extent, Page 6-25: The table entitled "Soil Analytical Results for Chemicals Believed to Have Been Used At Site 4" should include all chemicals detected above PRGs. As presented, this table does not include all of the chemicals known to have been used at the site. For example, antimony, lead, arsenic, mercury, and titanium were probably used in site operations, but these metals are

not included in this table. Given the unknown chemical uses at several former buildings and the impossibility of constructing a complete and accurate site history, it is impossible to know every chemical that was used at a site. Every chemical detected above PRGs should be included in the table and discussed in both the nature and extent of contamination section and in the fate and transport section.

Response: See response to global general comment 9. The table is meant to convey some sense of the types of chemicals used at the site and is not necessarily a definitive list. Adding every chemical just because it was detected above a PRG would not aid the development of a conceptual site model. The report will identify constituents with concentrations greater than PRGs and will discuss them qualitatively in the sections on nature and extent and fate and transport.

7. Comment: Section 6.4.3.2, Risk Drivers, Page 6-27: It is likely that the chromium, cadmium, and silver detected in elevated concentrations were associated with plating operations, but it does not appear that an investigation was done to determine the extent of cyanide, which was also associated with plating. Please clarify whether an investigation for cyanide was done in this area and if not, discuss how this data gap will be addressed.

Response: Various investigations conducted at Site 4 analyzed soil samples collected from beneath the plating shop for total cyanide, including the Phase 2B and 3 investigation in 1991 and the Data Gap Sampling in 2001 (see Section 6.2.1 of the draft final report). A total of 168 soil samples were analyzed for cyanide (Table 6-20). The maximum detected concentration was 18.6 mg/kg. The maximum non detect concentration was 2.3 mg/kg. The 2004 Region IX preliminary remediation goal for free cyanide is 1,200 mg/kg in soil. The preliminary remediation goal is not exceeded even assuming that the total cyanide is present as free cyanide. The Navy does not believe there is a data gap.

8. Comment: Section 6.4.3.2, Risk Drivers, Page 6-28: According to the text in this section, screening levels for metals in soil are based on the maximum metal concentrations detected in ambient soil. If the maximum metal concentration was anomalous and much higher than the average concentration detected in ambient soil, it seems that the screening level has the potential to be inappropriately high. It is also unclear if outliers were removed from the ambient data set. Please explain why it is appropriate to base the screening levels on the maximum metal concentrations detected in ambient soil and discuss whether outliers were removed from the ambient data set.

Response: See the response to global specific comment 4.

9. Comment: Section 6.4.4.5, Polynuclear Aromatic Hydrocarbons in Soil, Page 6-32: The text in this section states that the potential for leaching of PAHs from contaminated soil to groundwater is limited because of the lack of infiltrating water (because most of the site is paved). However, it is not clear whether most of the site will remain paved under the future use scenarios. Also, the presence of solvents and fuels may impact PAH transport. Please include a description of PAH fate and transport that accounts for the fact that less of the site may be paved in the future and for the presence of fuels and solvents.

Response: The following text will be added: "PAHs tend to bind to organic matter in soil where they degrade very slowly, if at all. PAHs in soil are mostly insoluble in water and exhibit low potential for migration, but can become mobile in the presence of petroleum hydrocarbons."

10. Comment: Section 6.5.3, Recommendations, Page 6-43: Soil at Site 4 is not recommended for further action in an FS, but this recommendation is based on an HHRA that did not include most of the data deemed acceptable for the RI and on an ERA that found that cadmium, copper, silver, and PAHs posed potential risk to ecological receptors but assumes that the risks are overestimated and therefore disregards them. In addition, potential continuing soil sources of contamination such as OWS 360 have not been sampled so it is unknown whether any soil needs remediation in these areas.

Response: Soil at Site 4 will be recommended for further evaluation in the FS. It is likely that the ecological risks are overestimated because the sites currently have no significant ecological habitat and future use is not anticipated to create significant habitat. Further evaluation of the OWS will be included in the draft final RI report. The Navy will investigate any data gaps associated with the OWS as part of the remedial design or remedial action for the sites.

11. Comment: Figure 6-2, Condition of Storm Sewers at Site 4: Aside from two labels on the figure that indicate "Sound Condition" and two labels that indicate "Condition Unknown", the condition of storm sewers cannot be determined by looking at this figure. Please revise Figure 6-2 so that the storm sewer lines with cracks and significant observed groundwater infiltration and the lines with no cracks or significant observed groundwater infiltration are clearly marked.

Response: Relevant information on cracks and significant observed groundwater infiltration will be added to Figure 6-2.

Site 11 General Comments

1. Comment: The text in Section 7.1.1 states that staining was visible south of Building 14 in a 1996 aerial photograph, but it is unclear whether sampling was done in this area since the stained area is not shown on any of the figures. This building is about 360 feet long, so it is important to understand exactly where this staining was observed. Further, with the exception of the area beyond the southwest corner, very few samples were collected south of the building. Please discuss the specific location of the observed staining and discuss whether samples were collected from this area. If samples were not collected in this area, discuss how this data gap will be addressed.

Response: The text will be revised to state that staining was observed immediately adjacent to the southern side of the building. The staining extended from the center of the building to within approximately 50 feet of the southeast and southwestern corners of the building's footprint. In addition, the aerial photographs will be included as an appendix to the report. The sufficiency of data will be evaluated and any data gaps will be identified in the draft final report.

2. Comment: PCBs were potentially used as a form of weed control near the site. It is also likely that there were transformers that may have contained PCBs associated with the buildings. This section notes that pesticides and PCBs were generally not detected in the EBS samples and states that a data gap does not exist even though pesticide and PCB data collected under the EBS investigation were of poor quality and that soil samples collected as a part of CERCLA investigations were not analyzed for pesticides and PCBs. The minimal number of sampling locations on Figure 7-5 indicates that EBS sampling was fairly sparse, indicating that the nature and extent of PCB and pesticide contamination may not be fully characterized at Site 11. Please explain how many EBS samples were analyzed for pesticides and PCBs, the number of detections and PRG exceedances, and the maximum concentrations for both pesticides and PCBs, and use this information to support the argument that there is no data gap.

Response: The text does not refer to the EBS samples as poor quality. Table 7-3 shows that three samples were analyzed for pesticides and nine samples were analyzed for PCBs. Of the samples analyzed for pesticides and PCBs, only three samples contained detectable concentrations of PCBs, none contained detectable concentrations of pesticides, and detection limits for all samples were below PRGs. Of the samples with detectable concentrations, one contained Aroclor 1260 at a concentration above the PRG. This information will be included in the data assessment section (Section 7.3) of the RI report.

Site 11 Specific Comments

1. **Comment:** Section 7.1.1, History, Page 7-4 and Section 7.2.3, Total Petroleum Hydrocarbon Investigation, Page 7-9: The text on page 7-4 states that significant groundwater infiltration was observed in the section of the storm sewer from manhole I to catch basin IB, but the relationship between the TPH plume and groundwater infiltrating into the storm sewer is not discussed. This observation of groundwater infiltration suggests that portions of the TPH plume that intersects the storm drains in the southern part of the site (Section 7.2.3, paragraph 2) may be entering the storm sewers and may be discharged to the Seaplane Lagoon or to San Francisco Bay. It is not clear whether any action has been taken to prevent this. Please discuss whether TPH-contaminated groundwater is entering the storm sewers and discuss where this water is discharged. Also, if TPH-contaminated groundwater is entering the storm sewers, please discuss whether any action has been taken to prevent discharge of this water to the Seaplane Lagoon or to San Francisco Bay.

Response: A figure showing sampling locations and the TPH plume will be included in the draft final RI. In addition, corrective action activities for CAA-11A and 11B will be included in the report. At the time the report was written, corrective action was underway at CAA-11A and planned for CAA-11B.

2. **Comment:** Section 7.4.3.1, Chemicals Believed to Have Been Used at the Site, Page 7-16: Further justification should be provided for the argument that the detections of chlorobenzene and methylene chloride at 030-MOD1-136 and 138-001-002, respectively, are likely associated with laboratory contamination of the samples. Please specify how far these sample locations are from Building 14, and whether the presence of these chemicals could be due to sources other than Building 14.

Response: The text (and associated table) will be updated to state, "The highest concentrations of chlorobenzene and methylene chloride occur at sample locations 030-MOD1-136 and 138-001-002, respectively. Sample location 030-MOD1-136 is located 120 feet south of the southeastern corner of Building 14, near USTs 37-17 and 37-18, which stored petroleum products. Sample location 138-001-002 is located 190 feet south of Building 14, near AST-598A, which stored aviation gas. These samples locations are south of the site boundary and far from Building 14, where these chemicals may have been used, and the concentrations detected are therefore likely associated with laboratory contamination of the samples." There are no known sources at these locations that could cause contamination by these chemicals, unless they are considered components of petroleum products.

3. Comment: Section 7.4.3.1, Chemicals Believed to Have Been Used at the Site, Page 7-16: The nature and extent section should include details regarding the vertical extent of contamination, but this information is not included consistently. Please include the depths that acetone and mercury were detected at near the industrial waste treatment line east of Building 627.

Response: The text will be revised to state, "Acetone and mercury were detected at their maximum concentration in soil near the industrial waste treatment line east of Building 627. They were detected at sample location M11-02 from 9.5 to 11 feet bgs."

4. Comment: Section 7.4.4.3, Polynuclear Aromatic Hydrocarbons in Soil, Page 7-19: The text does not include the fact that PAHs may also be associated with fuels and motor oil. Since all of Site 11 is a Corrective Action Area (CAA), it is likely that some of the PAHs are associated with the TPH contamination. Please revise the text to discuss sources of PAHs other than asphalt or fill materials.

Response: The text will be revised to state, "The maximum PAH concentration of 13.9 mg/kg, expressed as a B(a)P equivalents, was detected in samples collected near the former USTs at a depth of 4 to 8 feet bgs (sampling location C3S011B013). Widespread petroleum contamination was present near these USTs, and corrective action is ongoing.

PAHs were also detected in soil from 0.5 to 2 feet bgs at sampling locations C3S011B007, C3S011B012, and C3S011B020. Sampling locations C3S011B013 and C3S011B020 are located along the southern border of Site 11 in an area used for vehicle parking.

PAHs at Site 11 likely are associated with fuel, asphalt, or the material used to fill in the San Francisco Bay and construct Alameda Point."

5. Comment: Section 7.5.3, Recommendations, Page 7-29: It is unclear why the site is recommended for no further evaluation in an FS even though copper and PAHs in soil pose potential risk to ecological receptors. It is inappropriate to assume that the risks identified for ecological receptors are overestimated; the ERA is supposed to provide a conservative estimate of risk due to the uncertainties inherent in risk assessments. The results cannot be disregarded because they are believed to be overestimated. Although the site is mostly buildings and paved open space right now, and therefore does not contain much habitat, it is possible that under future use scenarios there will be

larger areas of unpaved open space that could serve as potential habitat for urban wildlife (squirrels, scrub jays, and American robins).

Response: Soil at Site 11 will be recommended for further evaluation in the FS. OU-2B is currently urban in nature and is likely to remain so in the future. Risk assessments are constrained by existing and likely future land uses. Because the site does not provide habitat, the risk are certainly overestimated for current ecological receptors.

6. Comment: Table 7-1: Monitoring Well D11-01 and sediment sample NPS-S11-01 are not included in this table. Please add the missing sample locations.

Response: There is no soil data associated with installation of well D11-01. NPS-S11-01 is a sediment sample collected from the storm drain, so it will not be added to the table.

7. Comment: Figure 7-7, Maximum Concentrations in Soil of Chemicals Used at Site 11: USTs 37-1 through 37-10 are not included on this figure. Please include these USTs on this figure.

Response: Figure 7-7 will be revised to include USTs 37-1 through 37-10.

Site 21 General Comments

1. Comment: According to former Naval Aviation Department (NADEP) employees, a drum storage area was formerly located on the west exterior side of Building 398 and mercury spills occurred frequently in Building 398, but sampling was not done in or west of Building 398. According to Figures 8-3 and 8-5, there were no soil samples located inside or outside the western side of Building 398, except that EBS samples 126-003-009 and 126-002-003 were located beyond the southwestern corner of the building. This represents a data gap. Also, no samples were collected beneath most of Building 398 and the maximum concentration of mercury was detected in a boring beneath the northeast portion of this building, so the extent of mercury contamination is unknown. In addition, the text states that building tenants cleaned and reconditioned floors to remove all staining and repaired cracks so visual inspection is not sufficient to determine the potential for contamination. Further, this area was formerly an aluminum smelter, but sampling has not been done beneath most of the building. Please discuss how these data gaps will be addressed.

Response: Grab groundwater and soil samples have been collected west of Building 398 and the results will be included in the draft final RI report. These results were not included previously because the samples were collected outside the boundary of OU-2B. Mercury results will be evaluated and if necessary the potential data gap for mercury will be addressed in the draft final RI. With regard to aluminum, please see the response to specific comment 4 on Site 21 for a detailed discussion.

2. Comment: Similarly, sampling has not been done in the vicinity of GAP 11, GAP 46 or SWMU 162 beneath Building 162, where solvents and hazardous waste were stored, so the nature and extent of contamination has not been delineated beneath Building 162. It is unclear why sampling beneath building focused on a narrow strip in the center of the building. Please discuss how this data gap will be addressed.

Response: Generator accumulation points (GAPs) and solid waste management units (SWMUs) and associated sampling will be further evaluated in an appendix to the draft final RI, and the recommendations in that appendix will be brought forward to the text of the draft final RI. If sampling shows no contamination then no additional sampling will be warranted. The sampling collected along the center of the building was part of the data gap sampling conducted in 2001 to evaluate the lateral and vertical extent of groundwater contamination, as stated in Section 8.2.1 of the RI report.

3. Comment: OWS-162 is noted as a place where hazardous materials were discharged but it does not appear that sufficient sampling was done to evaluate the nature and extent of contamination in this area. The text on page 8-2 references a soil sample collected near this location, but this sample is not shown on any of the figures. Since the nature and extent of contamination is unknown, it is premature to recommend this site for no further action (NFA). Please discuss how the nature and extent of contamination will be evaluated and delete the NFA recommendation on page 8-2.

Response: EBS Sample 135-SS-001 was collected from soil adjacent to OWS-162 as shown in Figure 7-5. No further action is recommended because the EBS did not recommend any additional sampling be conducted at this location based on the results of this sample.

4. Comment: The potential for PCB contamination associated with transformers was not addressed. Further, it does not appear that sampling was done in the vicinity of transformers to evaluate the extent of PCB contamination. If building walls and floors were repainted, a visual inspection would not be sufficient to evaluate potential PCB contamination. Please discuss the location of transformers, whether

any staining was evident in the vicinity of the transformers and whether sampling was done to assess the extent of PCBs. Also, please discuss how this data gap will be addressed.

Response: See the response to general comment 1 on Site 3.

- 5. Comment:** The extent of lead contamination has not been determined. Lead was detected in 66 of 78 samples, with the maximum concentration found at sampling location 126-002-003, near the southwest corner of Building 398 along the storm sewer line. Given that this location represents the maximum lead concentration, and the fact that this sample was located along the storm sewer line, it is unclear why additional samples were not collected during the CERCLA investigations (see Figure 8-3) in this vicinity. Please discuss how this data gap will be addressed.

Response: Lead was found at concentrations greater than the EPA PRG of 400 mg/kg in only two of 77 soil samples. The lead concentrations in 75 remaining samples were less than 100 mg/kg, indicating that lead contamination in soil is not widespread at Site 21. A lead concentration 450 mg/kg was measured in soil from the 0.5 to 1 foot depth interval at EBS sample location 126-002-003. Lead concentrations in two soil samples from an adjacent EBS soil boring (126-003-009) were only 3.4 and 2 mg/kg at the 0.5 to 1 foot and the 3 to 4 feet depth intervals, respectively. Therefore, it appears that the lead concentration at 126-002-003 does not represent widespread contamination. Consequently, the Navy has determined that there is no data gap for lead at Site 21.

- 6. Comment:** The extent of copper contamination in soil has not been determined. Copper was a component of jet engine lubricant, but only two locations were analyzed for copper from beneath the floor of Building 398 and all of the associated samples contained copper above the maximum ambient concentration of copper. One of two samples from beneath Building 113 had copper above ambient. The extent of copper contamination was not determined beneath either building. In addition, copper was detected above ambient levels in a shallow sample collected near a storm sewer (B07B-05). Since jet engine lubricant may have been discharged to drains, soil in the vicinity of the sanitary and storm lines should be evaluated for copper. Please discuss how these data gaps will be addressed.

Response: The Navy does not concur that a data gap exists and does not believe that any further evaluation of copper is necessary. The EPA Region 9 preliminary remediation goal for soil is 3,100 mg/kg assuming a residential exposure scenario. The maximum concentration of copper in soil at Site 21 is 148 mg/kg. There is no indication that copper

concentrations have any potential to pose a threat to human health. Although there are concentrations greater than background concentrations and copper was a potential component of lubricants (grease) for jet engines, there is no evidence that copper concentrations are present at levels that would pose a threat to human health and consequently no need for further delineation of copper concentrations. Jet engine lubricants that contain significant quantities of copper (greater than 10 ppm) are typically in the form of a grease which exists as a semi-solid paste. It would be extremely difficult to dispose of this material down a drain unless it was dissolved in solvent. The Navy does not believe that the soil around the storm drains or sanitary sewers needs further evaluation for copper since there have been no volatile organic compounds detected in soil at Site 21, except for those associated with petroleum hydrocarbons (benzene, toluene, ethylbenzene, and xylene). The Navy does not believe copper poses an ecological risk because the future land use precludes ecological habitat.

Site 21 Specific Comments

- 1. Comment:** Section 8.1.1, History, Page 8-4 and Figures: The text states that “a faded red and white rectangle on the concrete outside Building 398 was all that remained of NADEP GAP 45,” but the figures show this GAP inside Building 398. Please resolve this discrepancy and correct the text or the figures as necessary.

Response: NAPDEP GAP 45 is under a covered walkway, which appears on the figure as part of the building. The word “outside” will be removed from the sentence on page 8-2.

- 2. Comment:** Section 8.1.1, History, Page 8-5: Staining is associated with former Building 349 and the oil-filled transformer adjacent to the south side of the building. Also, during the Phase I EBS investigation, a hose was observed emerging from Building 349 and draining directly into the storm drain. Sampling should be done in the vicinity of Former Building 349 and the associated storm drain.

Response: The Navy has previously evaluated PCB containing transformers. The results of that evaluation will be incorporated into the draft final RI report. The portion of the storm drains near the oil-filled transformer near Building 349 will be reviewed to determine if any samples were collected and if the storm drain was cleaned. The results of this review will be included in the draft final RI. If no samples were collected and this portion of the storm drain was not cleaned it will be identified as a data gap and recommended for further evaluation in the FS.

3. Comment: Section 8.4.3.1, Chemicals Believed to Have Been Used at the Site, Page 8-18: The text states that copper was “generally detected at concentrations above the maximum background concentration in shallow soils beneath Buildings 398 and 113, but the only area where samples were collected beneath Building 398 was in the northeast corner. The extent of copper contamination beneath Building 398 is unknown. Please discuss how this data gap will be addressed.

Response: See the response to general comment 6 on Site 21.

4. Comment: Section 8.4.3.1, Chemicals Believed to Have Been Used at the Site, Page 8-18: The text notes that the location of the maximum concentration of aluminum does not correspond to the area at Building 398 where aluminum smelting activities are known to occur, but the samples were only collected from beneath the northeastern portion of this building. In addition, the nature and extent discussion should not only discuss the maximum concentration because the location of other detections are also of interest. Aluminum was detected at 43 of 44 samples from Site 21. The text should discuss the location of the 42 other detections and the location of these samples relative to the area at Building 398 where aluminum smelting activities are known to occur.

Response: Aluminum was never detected at a concentration above the PRG and is not a risk driver, so it was not discussed in further detail. The draft final RI will provide additional information about the aluminum smelting activities, if available.

Aluminum was included in the analyses of several samples that were collected below and around Building 398. The Navy believes adequate samples have been collected to assess risk from aluminum near Building 398 at Site 21.

5. Comment: Section 8.4.4, Fate and Transport and Figure 8-7, Maximum Concentrations in Soil of Chemicals Used at Site 21: The discussion of fate and transport does not include contaminants that were detected along sanitary sewer lines. Figure 8-7 indicates that several maximum concentrations were detected along sanitary sewer lines (acetone, trichloroethene, benzene, and xylene-total) and several maximum concentrations were detected along storm sewer lines (lead, 4-4'-DDD, 4-4'-DDT, Aroclor-1260, but these contaminants are not discussed in the fate and transport section. Please discuss the fate and transport of these chemicals in the text.

Response: All chemicals detected above a PRG or greater than background will be discussed in Nature and Extent sections and Fate and Transport Sections.

6. Comment: Section 8.4.4, Fate and Transport, Page 8-20: The fate and transport evaluation should discuss all chemicals detected above PRGs or background, not just the risk drivers. Also, the text identifies copper and lead in soil as the only chemicals driving risk even though PAHs and arsenic were also identified as risk drivers by the ecological risk assessment (ERA) and HHRA, respectively.

Response: The draft final RI sections on nature and extent and fate and transport will discuss all chemicals detected above a PRG or greater than background will be discussed in Nature and Extent sections and Fate and Transport Sections. As stated at the bottom of page 8-19, where the nature and extent of arsenic is discussed, concentrations of arsenic (maximum of 20 mg/kg) detected in soil at Site 21 are believed to be within background ranges typically seen in the San Francisco Bay Area.

Soil will be recommended for further evaluation in an FS, and a figure will be added to this report to show the B(a)P equivalent concentrations and sampling locations across the site. As stated on page 8-19, the maximum B(a)P equivalent concentration at the site was 0.172 mg/kg, which was well below the screening level of 0.62 mg/kg. PAHs were determined to pose risk to ecological receptors in a qualitative evaluation that was based only on the number of detections across the site, did not involve background levels PAHs, and concluded that risk to ecological receptors could not be discounted.

7. Comment: Section 8.4.4, Fate and Transport, Page 8-21: The last sentence of this section states that “the following sections present the fate and transport evaluation for each chemical driving risks to ecological receptors at Site 21.” Since both the HHRA and the ERA identified lead as a risk driver, human receptors should also mentioned.

Response: The sentence will be revised to state, “The following section presents the evaluation of fate and transport for each chemical driving risks to human and ecological receptors at Site 21.”

8. Comment: Section 8.4.4.2, Lead in Soil, Page 8-21: This section states that the maximum concentration of lead (450 mg/kg) was observed at sampling location 127-002-005. According to both Section 8.4.3.1 and Figure 8-10, this maximum concentration was observed at sampling location 126-002-003.

Response: This statement is an error. The text will be corrected to state, “The maximum concentration of lead of 450 mg/kg was observed at sampling location 126-002-003 at 0.5 to 1 feet bgs.”

9. Comment: Section 8.4.4.2, Lead in Soil, Page 8-21: Lead is considered relatively immobile because neither acidic conditions nor low sulfate concentrations are present at Site 21. Evidence of these claims, such as a range of pH values measured at Site 21, should be provided to support this claim. In addition, lead may have been associated with leaded gasoline. Please discuss analyses that were done that support the immobility of lead at this site or state that the mobility of lead at Site 21 cannot be determined.

Response: The pH ranges will be provided in the draft final RI, and Appendix D will be referenced for further detail. All samples analyzed for pH at the site are included in Appendix D. With regard to the relation of the lead in soil to leaded gasoline, it is highly unlikely that leaded gasoline would have affected the two areas at Site 21 when no aboveground storage tanks (ASTs) or underground storage tanks (USTs) were located on the southeastern corner of Building 398 near 126-002-003. Furthermore, the 100-gallon USTs (162-1 and 162-2) located off the northwest corner of Building 162 near B07B-05 contained diesel fuel.

10. Comment: Section 8.5.3, Recommendations, Page 8-31: No further evaluation in an FS is recommended for soil at Site 21, but this recommendation is based on inadequate risk assessments for human and ecological receptors. Arsenic and lead in soil pose potential risk to human receptors and copper, lead, and PAHs in soil pose potential risk to ecological receptors. This risk management decision should be made by the BCT. In addition, the extent of PCBs, lead, copper, mercury, and PAHs has not been determined, so this conclusion is premature. Please delete this recommendation and discuss how the data gaps will be addressed.

Response: The recommendations will be removed. The Feasibility Study will evaluate all sites with a risk greater than 1E-06 for potential remedial actions.

11. Comment: Figure 8-8 Site 21 Concentrations of Arsenic in Soil: The legend indicates that samples that exceed the screening level are shown in red, but the symbol for 127-02-005 is not red on this figure. Please resolve this discrepancy.

Response: Sample location 127-002-005 will be shown in red on Figure 8-8.

General Comments on Section 9, OU-Wide Groundwater Plume

1. Comment: The text states that pesticides and PCBs were not included in the risk assessment data set because they were not detected in 1991 and 1994

so they were not the focus of subsequent sampling, but according to Table 9-1, with the exception of some wells at Site 11, samples for pesticide and PCB analysis were only collected from 3 monitoring wells. Therefore, pesticides and PCBs were not detected because samples were not analyzed for them. This approach is insufficient to characterize contamination in an area as large as OU-2B, so the extent of contamination is unknown. The extent of pesticide and PCB contamination should be considered a data gap. Please discuss how this data gap will be addressed.

Response: Groundwater samples were collected from wells within each IR site and analyzed for pesticides and PCBs. No pesticides were detected at OU-2B and the detection limits were within or close to the PRGs. None of the facilities were used to mix or store pesticides; consequently, there is no reason to continually monitor for these chemicals. Because no chemicals were detected, they cannot be evaluated in the human health risk assessment. The detection limits for PCBs in groundwater samples from monitoring well ranged from 0.5 to 1 µg/L. These are elevated with regard to the PRG. Potential PCB releases from transformers have been evaluated by the Navy. The Navy does not believe there is a data gap at this time.

2. Comment: The extent of solvent contamination west and west-southwest of Building 398 is unknown because there are no monitoring wells or grab groundwater sample locations in this area. The western side of Building 398 was used for drum storage, so it is unclear why this area was not included in the investigations. Please discuss how this data gap will be addressed.

Response: Data gaps related to solvent contamination in groundwater will be addressed through additional plume delineation that will occur during the remedial action. This will be evaluated in the FS.

3. Comment: The extent of 1,1,1-TCA, 1,1,2-TCA, and vinyl chloride is unknown because DLs were between 100 and 5,000 ug/L. This is most likely due to high concentrations of TCE, but the result is that the extent of the listed chemicals is not known. This is demonstrated on Figure 9-14, where most of the listed values are non-detects. Please discuss how this data gap will be addressed.

Response: The Navy agrees the detection limits for 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-TCA, and vinyl chloride are elevated in some locations (primarily as a result of high concentrations of TCE). OU-wide groundwater is recommended for further evaluation in an FS and will be remediated. The elevated detection limits will be acknowledged in the draft final RI.

4. Comment: The source of 1,4-dichlorobenzene in the vicinity of MW360-1 has not been found. Concentrations of this compound generally increased during quarterly sampling in 2001 and 2002; this suggests that the source area is not at MW360-1. Please discuss how this data gap will be addressed.

Response: The Navy agrees that the concentrations of 1,4-dichlorobenzene appear to increase over time during 2001 and 2002 sampling events. This increase will be identified as a data gap in the draft final RI.

5. Comment: In many cases, the text states that 778 to 1542 samples were analyzed but only a limited number of these results are included on the extent of contamination figures. For example, chloromethane was analyzed in 778 samples, but only 12 sample results are presented on Figure 9-24. As a result, it is unclear whether elevated DLs prevented detecting this compound. Please include the number of samples with DLs above the RBSLs on figures and in the text. In addition, please use a different color to indicate sample locations with elevated DLs so that the extent of contamination can be evaluated.

Response: Twelve sample locations were shown on Figure 9-24 because the figure would be illegible if all sample locations were shown. Therefore, only locations where chloromethane was detected were included in the table on the figure.

Specific Comments on Section 9, OU-Wide Groundwater Plume

1. Comment: Section 9.1.1, Groundwater, Page 9-2: Since laboratory detection limits for some chemicals exceeded residential PRGs, it is unclear why Section 9.1 (OU-wide Groundwater Plume Data Assessment) states that DLs were sufficiently low to permit identification of potential health risks. For example, many of the Maximum DLs are 4 to 9 orders of magnitude greater than the PRGs. Please resolve these apparently conflicting claims.

Response: See the response to global general comment 11.

2. Comment: Section 9.1.1, Groundwater, Page 9-2: Direct-push groundwater data were used due to a lack of monitoring well data in the concentrated plume areas. If groundwater samples from direct push or standard borings were eliminated from the risk assessment, it is unclear how the risk assessment can be considered representative of site risk. Please explain why monitoring wells were not installed in the concentrated plume areas and discuss how groundwater contamination can be monitored over time without monitoring wells.

Response: Most of the data collected using direct-push methods were included in the HHRA. The appropriate text will be clarified by stating, "Generally, data from monitoring wells and using direct-push techniques collected from 1998 to 2003 were considered to reflect current site conditions and were included in the risk assessments."

It is difficult to assess at this time why groundwater monitoring wells were not installed.

3. Comment: Section 9.2.3, Nature and Extent, Page 9-7: The nature and extent section should present the types and concentrations, and provide an evaluation of every chemical that was detected above PRGs or background concentrations rather than only providing a detailed evaluation of those chemicals that are defined as risk drivers. This is important because some chemicals appear to be non-detects because DLs were elevated. Please include every chemical detected above PRGs or background in the nature and extent discussion.

Response: All chemicals detected above a PRG or greater than background will be evaluated in the nature and extent discussion.

4. Comment: Section 9.2.3.1, Chemicals Believed to Have Been Used at the Site, Page 9-10: The text notes that the highest concentrations of aluminum, copper, and mercury are located near Building 360, and then states that aluminum was used as aluminum oxide at Building 360, copper was used as a component in jet engine lubricant, and mercury was used at Building 162 to repair aircraft navigation instruments. Since locations where metals were used are associated with the locations where the maximum concentrations were detected, it is unclear why the use of mercury at Building 162 is mentioned, but the reported mercury spills at Building 398 are not mentioned. In addition, it is unclear why manganese, molybdenum, and vanadium are not included as metals used at the site; these metals are components of various steels. Please include a complete list of metals that could have been used at the site and also, discuss the known mercury spills in Building 398.

Response: The text was worded to indicate where chemicals likely would be located. The text will be restated as: "Aluminum was used as aluminum oxide in Building 360 and at the former aluminum recover facility, where Building 398 now exists. Copper is an ingredient in the jet engine lubricant that likely was used at OU-2B in Buildings 162, 360, and 398. Mercury was used at Building 162 to repair navigation instruments and in Building 398." Additional text will also be added to address potential mercury spills.

With regard to manganese, molybdenum, and vanadium as components of various steels, the list of potential chemicals that go into steel making is quite extensive. It would be speculative to include a potential list without conducting a detailed analysis of every steel component used at the site. The Navy acknowledges that these metals may be part of steel, but steel was not manufactured at the site.

- 5. Comment:** Section 9.2.3.2, Tetrachloroethene (PCE) in Groundwater, Page 9-12: The text states that PCE was detected at concentrations ranging from 0.2 to 330 µg/L, but then states that the maximum concentration was 14 µg/L. Please resolve this discrepancy. In addition, according to Figure 9-5, there were 18 samples with DLs above 25 ug/L; the number of samples with DLs above the PRG should be noted.

Response: The concentration of 330 µg/L will be revised to 14 µg/L. The 330 µg/L was an error. The text will be revised to discuss the numbers and types of samples with detection limits greater than PRGs.

- 6. Comment:** Section 9.2.3.2, Risk Drivers, Page 9-15: It is not clear that the concentration of benzene has actually decreased as stated in the text. The text states that several samples collected near the western end of Building 372 contained benzene at concentrations exceeding 100 ug/L, but since the samples were collected in 1995, "significant decreases in benzene concentrations have likely occurred since then." This is based on an unstated assumption that there is no source in this vicinity or that the source area has been removed, but the text in the next paragraph suggests that Building 372 is the source of this benzene contamination. Since more recent data is not available for this area and uncertainty exists regarding the current benzene concentrations in this area, the current concentration of benzene is a data gap that should be addressed by additional sampling. Please discuss how this data gap will be addressed.

Response: Based on the figure that will be included in the draft final RI, floating product is likely present near Building 372 and is likely a continuing source of benzene. The following text will be incorporated into the draft final RI: "In addition, several samples collected near the western end of Building 372 in 1995 contained benzene at concentrations exceeding 100 µg/L. More recent data are not available for this area; however, it is likely that a plume of free product petroleum hydrocarbons is present near Building 372 that could be a continuing source of benzene."

- 7. Comment:** Section 9.2.3.2, Methylene Chloride in Groundwater, Page 9-18: The methylene chloride discussion is not consistent with the description of the extent of contamination for other chemicals because it does not

include the range of detected concentrations. Please include the range of concentrations of methylene chloride detections.

Response: The text will be changed as requested.

- 8. Comment:** Section 9.2.4, Fate and Transport, Page 9-20: The fate and transport evaluation should include a discussion of the fate and transport of all chemicals detected above PRGs or background, not just the fate and transport of chemicals driving risk. This evaluation should be independent of the risk assessment. Please discuss the fate and transport of all compounds detected above PRGs or background.

Response: The nature and extent section and fate and transport section will continue to focus on those constituents determined to be risk drivers. All constituents detected above a PRG or greater than background will be evaluated in those sections.

- 9. Comment:** Section 9.2.4.1, Chlorinated Volatile Organic Hydrocarbons in Groundwater, Page 9-20: It is unclear why 1,4-dichlorobenzene, bromodichloromethane, chloroform, and chloromethane are not considered contaminants of concern when they were detected above their respective PRGs. The maximum DLs were 500 ug/L, so it is likely that these chemicals were present but not detected in some locations. Please discuss the listed chemicals in this section.

Response: Because all chemicals that pose a risk above 1E-06 or hazard index greater than 1 will be recommended for further evaluation in an FS, 1,4-dichlorobenzene, bromodichloromethane, chloroform, and chloromethane will be discussed in Section 9.2.4.1.

- 10. Comment:** Section 9.2.4.1, Chlorinated Volatile Organic Hydrocarbons in Groundwater, Page 9-20: It is unclear why the text states that DNAPL would migrate in the 10 to 55 foot depth interval. DNAPL migration is controlled by gravity and permeability, as well as the amount of DNAPL in the subsurface, and it is likely that after this much time, any DNAPL is stable unless it is disturbed. Please explain why DNAPL is believed to be migrating.

Response: The Navy agrees; dense nonaqueous phase liquids (DNAPL) are not likely migrating in the subsurface at the site. The text will be restated as follows: "TCE, 1,1,1-TCA, and 1,1-DCE are present at the site at concentrations that exceed 1 percent of the respective solubility limit, indicating that DNAPL may be present at the site. Generally, each of these compounds appears to be present at concentrations that exceed 1 percent of the solubility limit between 10 to 55 feet bgs. It is likely that DNAPL exists at the site and is present between 10 to 55 feet bgs."

11. Comment: Section 9.3.1, Nature and extent Conclusions, Page 9-28: It is inappropriate to compare hexavalent chromium to background and dismiss it as background when it was used in plating operations in OU-2B. A plausible mechanism for natural hexavalent chromium production has not been provided, so it is possible that hexavalent chromium is not naturally occurring at Alameda Point. Please delete the comparison of hexavalent chromium to background or provide a plausible mechanism for natural production of hexavalent chromium, including data to support this mechanism.

Response: Detected concentrations of hexavalent chromium in OU-2B groundwater will be discussed in relation to previous plating operations.

12. Comment: Section 9.3.1, Nature and Extent Conclusions, Pages 9-28 and 9-29 and Section 10.5.1, Nature and Extent Conclusions, Pages 10-14 and 10-15: It is inappropriate to conclude that detections of methylene chloride were due to laboratory contamination when this chemical was known to have been used at this site (Page 9-9), when these detections were not qualified because of blank contamination, and when most of the detections that exceeded the RBSL were located in close proximity to one another. Also, there are two paragraphs in which methylene chloride is discussed in these sections. Please delete the statement that methylene chloride is due to laboratory contamination and consolidate the two paragraphs into one.

Response: Please see EPA global specific comment number 1.

Appendix A

1. Comment: It appears that the first page of the boring log for boring CPT-S4-01 has been omitted. Please ensure that this page is included in the final.

Response: The first page of CPT-S04-01 does not exist and therefore cannot be included.

Errata

1. Comment: Section 3.3.3, Total Petroleum Hydrocarbon Program Investigations, Page 3-7: This section states that "sampling was conducted at Site 3 within CAA and CAA 3C." The name of the first corrective action area mentioned is incomplete. Please provide the complete name of the CAA.

- Response:** The text will be corrected to state, "sampling was conducted at Site 3 within CAA 3A, CAA 3B, and CAA 3C."
- 2. Comment:** **Section 7.2.1, Comprehensive Environmental Response, Compensation, and Liability Act Investigations, Page 7-6:** The text in the second paragraph states that the types of samples collected and analyses performed during the 1991 investigations were developed based on information gathered in March 1998. Please correct this error.
- Response:** The text will be corrected to state "...information gathered in March 1988."
- 3. Comment:** **Section 8.1.1, History, Page 8-5:** The text states that at Former Building 349, "staining and was evident on the pad." Please revise this sentence so that the omitted word is included.
- Response:** The text will be corrected to state, "All that remained of Building 349 in the 1996 photograph was a concrete pad; staining was evident on the pad."
- 4. Comment:** **Section 8.5.1, Nature and Extent Conclusions, Page 8-29:** The first paragraph of this section states that there are four principal areas where chemicals appear to have been released to soil, then proceeds to list five areas. Please resolve this discrepancy.
- Response:** The text will be corrected to state, "There are five principle areas where chemicals appear to have been released to soil..."
- 5. Comment:** **Section 9.2.3.2, Risk Drivers, Page 9-20:** The sentence that states that thallium concentrations in samples collected in 2002 from monitoring wells MW97-2, D03-01, and D04-03 "were the screening level" should presumably read "were below the screening level." Please revise the text accordingly.
- Response:** The text will be corrected as requested.

General Comments on the Human Health Risk Assessment

- 1. Comment:** The discussions in the risk assessment frequently refer to the "1 x 10⁻⁴ CERCLA bright line." The use of this term is inappropriate. CERCLA does not specify any absolute risk levels, and EPA uses the general risk range of 10⁻⁴ to 10⁻⁶ as a target range within which the Agency determines how best to manage risks, including possible remediation options, associated with Superfund cleanup actions. As stated in EPA, 1991, "the upper boundary of the risk range is not a

discrete line at 10⁻⁴ in making risk management decisions.”
Accordingly, please delete all references to the CERCLA bright line.

Response: The term “CERCLA bright line” was used only as a point of reference. The term will be removed from the text. The term will generally be replaced with “the upper end of the risk management range.”

2. Comment: In the 2.x-series tables summarizing chemicals detected at each site, clarify whether the values shown in the column titled “Range of Detection Limits” represent the method detection limits (MDL) or the sample quantitation limits (SQL). For example, Table F-2.3 lists detected 1,1-dichloroethene detected at 0.001 mg/kg, while the range of MDLs is shown to be 0.01 to 0.011 mg/kg. It is not clear how an analyte may be “detected” at a concentration an order of magnitude less than the MDL. Data are typically assigned a J-qualifier to represent an estimated value when the concentration in the sample is greater than the MDL but less than the SQL. As it cannot be reliably demonstrated that an analyte is present if the sample concentration is less than the method or instrument detection limit, assigning an estimated value to such results is questionable.

Response: The “Range of Detection Limits” represents the sample quantitation limit. The range of detection limits in Table F-2.3 for 1,1-dichloroethene should be 0.001 to 0.011 mg/kg. The error will be corrected.

3. Comment: The risk characterization discussions (Section 7) should include a section of cumulative risk from all relevant media and pathways for each receptor population where concurrent exposure is considered likely. As presented, the risk and hazard estimates are presented separately for soil, soil gas, and groundwater exposures, making it difficult to discern total risks and hazards for each of the sites. Please present the cumulative risk for all media and pathways for each receptor population.

Response: The draft final HHRA will include a discussion of cumulative risks from all relevant media.

Specific Comments on the Human Health Risk Assessment

1. Comment: Section 4.5.3, Detection Frequency, Page F-14: EPA does not support the screening of chemicals of potential concern based on frequency of detection when used in conjunction with risk-based screening criteria (i.e., PRGs). Please do not use this approach in the risk assessment.

Response: The risk assessment was revised and no screening of chemicals based on frequency of detection was conducted.

2. Comment: Section 4.6.2, Tier 1 Evaluation, Page F-16: The text in this section should clarify that the Regional Water Quality Control Board (RWQCB) screening values for nonchlorinated VOCs were used as is, and were not adjusted upwards by a factor of 10 to account for assumed biodegradation in the vadose zone. The screening values presented in the RWQCB Tables E-1a and E-1b represent output values from the Johnson and Ettinger model that have already been adjusted by a factor of 10. We do not concur with this approach. Screening of detected analytes from quantitative evaluation in the risk assessment should be based on conservative assumptions so that contaminants are not inappropriately screened from further evaluation. Accordingly, the values for nonchlorinated VOCs presented in the RWQCB guidance should be adjusted downward by a factor of 10 prior to the Tier 1 evaluation. Alternately, the more conservative values from EPA's Vapor Intrusion Guidance may be used.

Response: The text will be clarified to state that a direct comparison of the RWQCB screening values for nonchlorinated VOCs were compared against the 95 percent upper confidence limit (UCL) or the maximum concentration at the site to eliminate chemicals after the initial screen was complete. The only nonchlorinated VOCs brought into the risk assessment after the initial screen were benzene, ethylbenzene, and trimethylbenzene. If the RWQCB screening values for these compounds were adjusted downward by a factor of 10, the outcome of the screening would not change for benzene or ethylbenzene. '

3. Comment: Section 4.7.2, Chemicals of Concern for Groundwater and Soil Gas via Vapor Intrusion, Page F-17: The text in the first part of this section is redundant with the text in Section 4.6.2. As such, it is possible to interpret that an additional screening was employed in the selection of contaminants of potential concern (COPCs) for this pathway. As this is not the case, please delete the text in this section.

Response: In general, three screens were completed in the draft HHRA, the first against the EPA vapor intrusion values. The second screen was against the RWQCB values, and the third screen was a qualitative evaluation. The draft final HHRA will not include a COPC screen for the vapor intrusion pathway.

4. Comment: Section 4.6.2, Tier 1 Evaluation, Page F-16: The Tier 1 evaluation employed here uses screening values developed by the San Francisco Bay RWQCB to determine whether further analysis of vapor intrusion into indoor air is appropriate. However, the RWQCB screening levels for TCE are calculated using a cancer slope factor

that is approximately 60 times less than the slope factor for TCE used in the risk assessments. For purposes of screening, conservative values should be employed so that contaminants are not inappropriately screened from further consideration in the risk assessment. The Tier 1 screening value for TCE should be adjusted such that it is based on the same toxicity criteria used in the risk assessments, and the screening process reevaluated using the revised screening value.

Response: The RWQCB uses the California EPA slope factor for TCE in developing screening levels. TCE exceeds the RWQCB screening level and was evaluated in the draft HHRA. The draft risk assessment used the U.S. EPA slope factor for TCE to evaluate risk after a chemical exceeded the screening levels. However, the draft final HHRA will not include a COPC screen for the vapor intrusion pathway.

5. Comment: Section 4.7.2.2, Soil Gas Tier 1 and Advanced Tier 1 Evaluation, Page F-19 to F-21: We do not concur with the decision process used to eliminate contaminants detected in soil gas from further evaluation in the risk assessments. Soil gas samples collected at 1.5 feet bgs are used as a basis for excluding further consideration of the vapor intrusion pathway from the risk assessment even when substantial contaminant concentrations (five orders of magnitude in some instances) were detected in samples collected at 3 to 5 feet bgs. In all such instances it appears that there is no overlying structure at these sampling locations. It seems likely that the shallow (1.5 feet bgs) samples were affected by breakthrough of ambient air and that these samples should be considered unreliable in the absence of further qualitative evaluation. While the depth to groundwater makes soil gas sampling at a depth of at least 5 feet bgs impossible in many instances, the Navy should take into consideration the possibility that such shallow samples are affected by ambient air breakthrough, changes in barometric pressure, and temperature. Further, it is implausible to presume that benzene detected in soil gas concentrations exceeding 132,000 ug/m³ at 4 feet bgs does not pose a substantial likelihood of migrating into indoor air. To ensure that potential risks associated with intrusion of VOCs into indoor air are properly evaluated in the risk assessment, all locations where VOC concentrations exceeded screening levels in samples collected between 3 and 5 feet bgs should be evaluated for vapor intrusion into indoor air.

Response: Soil gas was not used to quantitatively calculate risk; instead, it was used to support the risk from vapor intrusion calculated using concentrations in groundwater. The method of choosing the sample closest to the surface was applied consistently throughout the analysis. The only soil gas sample location where concentrations were detected at depth (4 feet) but not in samples collected near the surface (1.5 feet) was sample S04-DGS-

SG30, where concentrations of benzene were detected at 4 feet but not at 1.5 feet.

The text that states, "Therefore, since these three chemicals did not persist in the vadose zone at the shallow soil gas location, they will not migrate significantly to the land surface or permeate aboveground concrete slabs" on page F-21 will be removed, and the draft final HHRA will not include a COPC screen for the vapor intrusion pathway.

6. Comment: Section 4.7.2.3, Indoor Air Potential Current Commercial/Industrial Worker Exposure, Page F-22: The text discussing occupied buildings at Site 3 is overly repetitive as it discusses the proximity of Building 517 to "impacted groundwater" for Building 517, Building 119, and Building 527. Please discuss the proximity of Buildings 119 and 527 to subsurface VOC contamination. In addition, the conclusion that the potential for vapor intrusion into indoor air is not significant seems to be based on the fact that no groundwater or soil gas samples were collected within 100 feet of the perimeter of the buildings. Lack of sampling is not evidence of lack of contamination. Revise the text in this section to describe these locations relative to the known extent of VOC contamination in subsurface soil and groundwater at OU-2B.

Response: The Navy agrees the lack of sampling is not evidence of a lack of contamination. The draft final HHRA will not include a COPC screen for the vapor intrusion pathway.

7. Comment: Section 4.7.2.3, Indoor Air Potential Current Commercial/Industrial Worker Exposure, Page F-23: The text does not state whether TCE and vinyl chloride were detected above Tier 1 screening concentrations in groundwater. Clarify whether concentrations of TCE and vinyl chloride that exceed Tier 1 screening concentrations were noted in groundwater.

Response: The draft final HHRA will not include a COPC screen for the vapor intrusion pathway.

8. Comment: Section 4.7.2.4, Indoor Air Potential Future Residential or Commercial/Industrial Worker Exposure, Page F-23 to E-24: It is not clear why only a single location, where the maximum concentrations of VOCs in groundwater were detected, was selected for evaluation for residential exposure to VOCs in indoor air. Such an analysis will not provide information on whether other areas of OU-2B are suitable for potential residential reuse without a remedial response to address VOCs in groundwater. An evaluation of risk and hazard associated with potential commercial/industrial and residential reuse should be conducted for each groundwater contaminant plume in OU-2B where

VOC concentrations in groundwater exceed screening levels. In addition, as previously noted, use of soil gas results for benzene collected at a depth of 1 foot bgs should not be considered reliable for inclusion in this evaluation.

Response: As stated in the response to specific comment 5 of the HHRA, results for soil gas were used only to support the vapor intrusion risk and to evaluate risk to current human receptors in the currently occupied buildings. Data for groundwater were used to assess risk to indoor air across the site. Furthermore, the risk assessment is intended to evaluate risk at the site — in this case, for the OU-wide groundwater plume — and not for individual locations.

9. Comment: Section 5.3.2, Summary Statistic and Proxy Values, Page F-31: The text in this section is poorly written, so it is difficult to interpret the procedures used. Further, the apparent use of inconsistent terminology also makes it difficult to interpret the process the Navy used in calculating summary statistics and exposure point concentrations:

- The term “samples” is apparently used interchangeably to describe individual sample results as well as sample or data sets. Please clarify.
- It is not clear why the mean and standard deviation were determined by taking the median values for the mean and standard deviation “generated” during distributional testing. Assuming that a discrete proxy value was used for nondetected results, the mean and standard deviation should only have been calculated on the normal and log-transformed data once.
- Clarify whether the terms detection limit and reporting limit are used interchangeably in this section. In some instances, the reporting limit is also used to identify the sample quantitation limit. Please use the correct terminology.
- Clarify in which instances one-half the reporting or detection limit was used as a proxy value for nondetects versus those instances where a simple substitution of the reporting or detection limit was used. Note that it may not be appropriate to use a value of one-half the reporting or detection limit when using distribution-dependent methods to calculate the 95 percent upper confidence limit on the mean when the same proxy value was not used to determine the distribution, mean, and standard deviation.

- All equations and tables needed to verify calculation of the exposure point concentrations should be included in the RI. As this RI will become part of the public record for this site, it is not appropriate to require extensive access to additional literature. All calculations and other methodology should be completely and clearly presented.

Response:

The term "data set" will be used in place of the term "samples" when referring to the collection of samples.

Because of the large number of nondetects in the data set, the mean and standard deviation was calculated reiteratively. Each time the mean and standard deviation were calculated, for each sample with a nondetect concentration, a value between 0 and the detection limit was randomly assigned. Thus, each sample with a nondetect value was not treated as a discrete proxy value, but rather a random variable. The process was repeated 1000 times which generated a distribution of means and standard deviations. It was the median of these generated values for the mean and standard deviation that was used then to calculate the exposure point concentration.

The term detection limit is used to describe the value at which a chemical was actually detected. The reporting limit is used to discuss the values at which the chemical was reported when non detect (i.e. the reporting limit could be non detect 100 times the normal reporting limit if the sample needed to be diluted to obtain a verifiable result).

The method used to calculate the exposure point concentration did not use a simple substitution of one-half the detection limit.

Because of the methods used to calculate the exposure point concentration represent an advanced use of statistical concepts and computer modeling, it is difficult to present equations that can be used to generate similar results. The Navy will evaluate appropriate methods to present the techniques and methods used in the process.

10. Comment:

Section 5.4.2, Pathway-Specific Intake Considerations, Page F-33:
Please revise the text in the first complete paragraph to correctly note that the derivation of the particulate emission factor obtained from the Region 9 PRGs assumes that the source area is 50 percent covered by vegetation.

Response:

The change will be made as requested.

- 11. Comment:** Section 6.1, Reference Doses, Page F-35: Please revise the text in this section to note that recent revisions to EPA guidance (EPA, 2003) now specify the appropriate hierarchy for obtaining toxicity criteria for use in Superfund risk assessments.
- Response:** The text will be revised to reflect the current toxicity value hierarchy.
- 12. Comment:** Section 6.3, Route-to-Route Extrapolation, Page F-38: The correct reference for EPA guidance on adjusting oral toxicity values when evaluating dermal exposure is EPA, 2001, not the PRG tables as stated in this section. Please revise accordingly.
- Response:** The change will be made as requested.
- 13. Comment:** Section 6.4, Surrogates, Page F-39: Please clarify that total chromium toxicity values represent values for trivalent chromium rather than hexavalent chromium.
- Response:** The change will be made as requested.
- 14. Comment:** Section 7.2, Characterization of Cancer Risks, Page F-42: The discussion in this section and in subsequent site-specific risk assessments of a specific risk management range contradicts EPA Policy on risk characterization (EPA, 1995). In addition, as noted in the text in this section, the goals set out in the NCP are applied once a decision to remediate a site has been made, which is not the case at this point. Further, the referenced EPA directive refers to the role of the risk assessment in remedy selection, and it is not relevant to the presentation of risk and hazard estimates in the risk assessment. In the site-specific risk assessments, delete the references to EPA's risk management range, as the role of the risk assessment is only to provide an unbiased estimate of exposure and associated health risks.
- Response:** The term "risk management range" will be deleted from the HHRA.
- 15. Comment:** Section 7.5, Site-Specific Risk Characterization Results, Page F-44: The text in this section states that total risk results are presented in Section 7.5.4. However, Section 7.5.4 discusses only the total risk associated with analytes screened from the risk assessment because concentrations did not exceed residential PRGs, and these risk and hazard estimates continue to be separated according to media. Please correct the reference to this section.
- Response:** The text will be corrected as appropriate.

16. Comment: Section 7.5, Site-Specific Risk Characterization Results, Page F-44: The third paragraph of this section presents contradictory information. It states that the presentation of additional decimals in text and tables is "to facilitate mathematical comparisons" and to avoid "rounding errors," but that the presence of additional decimal places did not imply significance. It is unclear how it is possible to present decimal places in text and tables without them being viewed as significant, particularly when one of the stated purposes is to "facilitate mathematical comparisons." The rationale for presenting risk and hazard estimates to only one significant figure is to avoid the appearance of a greater degree of accuracy than is possible, and the presence of any "rounding errors" must be viewed with this fact in mind. Hence, any attempt at a mathematical comparison using figures that are not significant is misleading, and the presentation of excessive significant figures could be viewed as an attempt to knowingly encourage such comparisons regardless. Consistent with EPA guidance on risk assessment for Superfund (1989), revise the risk assessment such that risk and hazard estimates are presented to one significant figure in all text and tables.

Response: The Navy does not feel that it is necessary to change the Risk Assessment Guidance for Superfund (RAGS) D Tables. They are not meant to convey an inappropriate level of accuracy. They were included this way so that values could be checked. One significant digit will be used in the text of the document.

17. Comment: Section 8.1, Uncertainty in Data Reduction, Page F-66: The text in this section states that including analytes where the maximum detected concentration does not exceed the risk-based screening levels would overestimate risk by including chemicals that are not related to site operations. There are two flaws in this reasoning. First, it implies that all site-related contamination must occur to a sufficient degree that risk-based screening levels would be exceeded, and second, whether or not a contaminant is related to site activities is not relevant to cumulative risk estimates if non "site-related" contamination is proximal to that associated with site activities, resulting in concurrent exposure. Please delete this statement or provide additional clarification.

Response: It is unlikely that chemicals excluded from the risk assessment would have a significant impact on risk. The text will be revised to state, "The exclusion of chemicals where maximum detected concentrations do not exceed the risk-based screening level could under estimate risk; however, the risk from these chemicals would not pose an appreciable risk or change the results of the risk assessment."

**RESPONSE TO EPA COMMENTS (SOPHIA SERDA, REGIONAL TOXICOLOGIST,
US EPA REGION IX)**

- 1. Comment:** **Human Health Risk Assessment Rejected. Suggest the Navy use the Human Health Risk Assessment for IR 28 Todd Shipyard as a model to be followed for the Human Health Risk Assessment at OU2B and all future Human Health Risk Assessments for Alameda Point.**

Response: Given that the EPA did not provide a reason why the risk assessment was rejected, it is unclear why EPA suggests using the human health risk assessment for IR 28.

- 2. Comment:** **In Appendix F, the Risk Assessment focuses on data reduction rather than assessment of risk. The methodology used to deselect detected chemicals is not warranted. All detected chemicals must be used to quantify risk.**

Response: The elements used to select the data set for the human health risk assessment are derived from EPA and Navy guidance documents.

- 3. Comment:** **The human health risk for the future resident does not include ingestion of homegrown produce. Soil risks for the future resident are underestimated!**

Response: Future hypothetical ingestion of homegrown produce will be evaluated in the draft final RI. The results will be included as an attachment to the HHRA in Appendix F.

- 4. Comment:** **Data collected for OU2B are not included in the risk assessment. In most cases it is unclear why certain data were not used.**

Response: Data collected for OU-2B are included in the risk assessment. See the response to global general comment 10, which explains why certain data were not used in the risk assessment. In the next version, data will not be screened to eliminate samples detected infrequently or at concentrations less than the PRG.

Errata

- 1. Comment:** **Page F-39: Change Cis-1,2,-Dichloroethene in the 5th bullet to cis-1,2-Dichloroethene.**

Response: The change will be made as requested.

- 2. Comment:** **Page F-40: Change N-hexane in the bullet at the top of this page to n-Hexane.**

Response: The change will be made as requested.

General Comments on the Ecological Risk Assessment

- 1. Comment:** The Ecological Risk Assessment (ERA) is referred to as a “modified BERA,” in which site-specific assumptions were used. However, without first conducting a screening-level ecological risk assessment (SLERA) using all available data, it is not evident that a site-specific evaluation is warranted. The ERA does not appear to rely on the results of the cited 1999 ERA; instead, it appears that the current report consists of a new screening-level evaluation of data collected in order to fill data gaps identified in the 1999 report. Further, the use of less-conservative exposure assumptions in the report, such as lower exposure point concentrations (i.e., 95 UCL or arithmetic mean) and effects-based toxicity values (i.e. Lowest-Observed-Adverse-Effects Levels) is not appropriate prior to conducting a screening-level assessment in which chemicals of potential concern should be selected by comparing maximum chemical concentrations to chronic (i.e., No-Observed-Adverse-Effect) toxicity benchmarks.

The current ERA is not acceptable because it does not follow the conservative screening process set forth in EPA Guidance. For example, the comparison to background concentrations is not appropriate as a screening step according to EPA policy, and the lack of sufficiently conservative exposure parameters in food chain modeling calls into question the results of the exposure assessment for wildlife receptors. The ERA should be revised to complete a SLERA (Steps 1 and 2 of 1997 EPA Guidance), in which all data is considered in a Scientific/Management Decision Point and risk managers can decide whether further site-specific evaluation is warranted at any of the sites. Please revise the ERA to follow Steps 1 and 2 of EPA Guidance, incorporating conservative exposure assumptions.

Response: The modified ecological risk assessment (ERA) presented in this remedial investigation report more than fulfills the purposes of a screening-level ecological risk assessment (SLERA) envisioned by the reviewer, because it provides an initial screening with sufficient information to support risk management decisions. SLERAs have been conducted at a number of similar sites at Alameda Point. In all cases, additional assessment of the sites was required based either on background concentrations of metals, ambient concentrations of pesticides or PAHs, or site-specific contaminants. These sites currently support no significant ecological habitat, and future use is not anticipated to create significant habitat. The Navy decided to move the process forward and evaluate all sites and

chemicals in the modified ERA, which used more site-specific and detailed information than is normally considered in a SLERA.

The use of 95UCL concentrations is believed to be appropriate based on the robustness of the available data sets. The assessment used both no observed adverse effects level (NOAEL)- and LOAEL-based toxicity data to provide information to bound the range of risks for the risk managers.

- 2. Comment:** The screening steps described in Sections 3.5.6.1 and G.1.2.1 are not appropriate in a conservative, screening-level evaluation of potential ecological risk. Consideration of frequency of detection, background concentrations, and dilution factors should not be incorporated prior to a comparison of the maximum detected concentration (or ½ the detection limit) of each chemical in soil and groundwater to a conservative, media-specific screening benchmark. Please revise the ERA to provide this conservative screening prior to considering frequency of detection, background, and dilution of groundwater as part of the risk characterization.

Response: Please see the response to general comment 1, above. The Navy believes that the factors used to identify contaminants of potential ecological concern are appropriate and serve to eliminate those chemicals that pose a negligible risk. EPA risk assessment guidance allows use of frequency of detection as a screening criterion. Comparison of inorganic constituents to background concentrations using rigorous statistical methods is an accepted methodology for eliminating inorganic chemicals that are representative of background conditions. Bioaccumulation potential was used only to retain organic chemicals that might otherwise have been eliminated based on low frequency of detection.

Specific Comments on the Ecological Risk Assessment

- 1. Comment:** Section 3.5.6, Ecological Risk Assessment Approach, Page 3-28: It is unclear why the groundwater to surface water exposure pathway is not considered complete for Sites 3 and 4. This section and Section G.1.2.2.5 state that the aquatic receptor pathway is not considered complete for Sites 3 or 4; Section G.1.2.2.5 implies that groundwater at these two sites does not have the potential to reach Seaplane Lagoon. However, Section G.1.2.2.2 states that groundwater expression is considered a complete pathway for evaluation purposes, and the ERA evaluates COPECs for groundwater at OU2-B (Sections G.1.2.1.2 and Section G.2.4).

It appears that the aquatic receptor pathway should be considered complete for Sites 3 and 4. Moreover, according to the Draft Storm Sewer Study, Sites 3 and 4 at one time contained damaged sewer lines

and/or points of infiltration. Since storm sewer bedding can act as a preferential pathway, OU2-B is in close proximity to Seaplane Lagoon, and 4 special status fish potentially exist at this site, please revise the ERA to consider the aquatic receptor pathway complete for all 4 sites.

Response: The migration pathway of contaminants from groundwater to surface water is considered complete and the ecological risk assessment did evaluate potential impacts from groundwater migration (by any route) to the Seaplane Lagoon. The text will be corrected to clarify any errors or unclear statements.

2. Comment: Section 3.5.6.1, Screening for Chemicals of Potential Ecological Concern, Page 3-29: It is unclear which depth interval was used to estimate risk. The text in Section 3.5.6.1 states that soil data for each site were aggregated at a depth interval of 0 to 4 ft bgs, yet Tables G-27 through G-30 suggest that hazard quotients were calculated for "surface soil." Please provide further rationale for evaluating the 0-4 foot bgs depth interval.

Response: The hazard quotients in Table G-27 through G-30 will be renamed "Hazard Quotient by Measurement Endpoint for Soil at Depths from 0 to 4 Feet". Further rationale will be incorporated into the text as well.

3. Comment: Section 3.5.6.5, Uncertainty, Page 3-36: The text states that background metals and ambient levels of pesticides were considered. However, it doesn't appear that ambient levels of pesticides were considered as part of risk characterization, and no data is presented regarding ambient concentrations. Please remove the mention of ambient levels of pesticides from the text.

Response: The change will be made as requested.

4. Comment: Section G.1.1, Scope, Page G-2: The ERA implies that its use of conservative assumptions minimizes the probability of underestimating ecological risk. The assumptions in this RI are not consistent with the conservative approach typically employed during a SLERA. For example, EPCs used in this evaluation were the lower of the maximum detected concentration or the 95 percent upper confidence limit (UCL 95) concentration, and food chain modeling incorporates non-conservative assumptions. Please remove this statement from the ERA as it misleads the reader.

Response: There is no current habitat at the site and none is anticipated in the foreseeable future. This will be clarified in the report text. Consequently, in the absence of complete pathways, any calculation of risk is by

definition an overestimate. It is acknowledged that this ERA relies heavily on professional judgment to evaluate the uncertainty associated with information taken from the literature and extrapolations that were used in developing some of the parameters to estimate exposures. The use of "realistic" assumptions in this modified ERA may be taken out of context in this section, since the modified ERA still relies heavily on literature-derived information and extrapolations from the literature. Site-specific information could not be collected because of the urban/industrial nature of the Alameda OU-2B sites. Therefore, many of the same uncertainty factors that would normally be associated with a SLERA are still an uncertainty in this modified ERA. The text was not intended to state that a SLERA is "overly conservative;" rather, it is intended to indicate that assumptions in the SLERA process are conservative and may result in overestimates of site-specific parameters. This modified ERA reduces the conservatism by a factor. The uncertainty associated with the use of these literature-derived values is still present without site-specific information and needs to be considered in the risk management decisions for the OU sites.

- 5. Comment:** **Section G.1.2.1, Screening for Ecological Chemicals of Potential Concern, Page G-2: The text states that the UCL 95 was used as the exposure point concentration (EPC) for most chemicals. However, in the absence of an extremely robust data set, the maximum concentration should be used as the EPC to select and evaluate chemicals of potential concern. Please revise the ERA to use the maximum detected concentration as the EPC.**

Response: A significant data set exists for all of the sites. In preparing the FSP for supplemental RI data gap sampling (Tetra Tech 2001), the Navy, DTSC, and EPA agreed that the proposed sampling for these sites would provide a sufficiently robust data set for all uses. As described in Sections G.1.2.1 of Appendix H, the adequacy of the data set was evaluated for each chemical at each site. The EPC was selected to be the 95UCL or the maximum detected concentration if the 95UCL concentration was greater than the maximum detected value.

Tetra Tech. 2001. Final Field Sampling Plan Supplemental Remedial Investigation Data Gap Sampling For Operable Units 1 and 2. June 14.

- 6. Comment:** **Section G.1.2.1.1, Identification of Ecological Chemicals of Potential Concern in Soil, Page G-3 and Section G.1.2.1.2, Identification of Ecological Chemicals of Potential Concern in Groundwater, Page G-4: It is not appropriate to screen for COPECs based on frequency of detection, background concentrations, or dilution factors prior to completing a SLERA. Revise the ERA to evaluate all**

detected chemicals ($\frac{1}{2}$ the detection limit of non-detected chemicals) and remove the screening steps based on frequency of detection, background, and dilution as “screening steps.”

Response: This document is based on EPA and Navy guidance and the Navy believes it is appropriate to conduct the screenings of COPECs. The following citation will be added to the References for Appendix I and appropriately cited on page I-3 in Section I.1.2.1 Screening for Ecological Chemicals of Potential Concern:

EPA. 1999. “Issuance of Final Guidance: Ecological Risk Assessment and Risk Management Principles for Superfund Sites.” Office of Solid Waste and Emergency Response (OSWER). Washington, D.C. Directive 9285.7-28 P. October.

Navy. 2003. “U.S. Navy Ecological Screening and COPC Refinement for Sediment, Soil, and Surface Water.” July.

7. Comment: Section G.1.2.2.4, Development of Toxicity Reference Values for Soil, Page G-9: The use of high Toxicity Reference Values (TRVs) is not appropriate in estimating exposures in a screening-level evaluation. The ERA should be revised to omit high TRVs from the initial risk calculations because they do not yield the most conservative estimate of potential effects.

Response: See response to EPA General Comments on the Ecological Risk Assessment #1.

8. Comment: Section G.1.2.2.4, Development of Toxicity Reference Values for Soil, Page G-10: Body weight extrapolations were employed to adjust TRVs for wildlife receptors. The current recommendation from the Region 9 Biological Technical Assistance Group (BTAG) is that allometric scaling of TRVs be conducted only when the body weight of the test species used to develop the TRV is more than two orders of magnitude greater than the target receptor in the ERA. Thus, please remove the extrapolations from the RI.

Response: The use of a scaling factor for avian receptors follows Navy EFA West 1998 TRV guidance. These allometric conversion equations were developed by Sample and others (1998) and were used to extrapolate doses according to methods described by Opresko and others (1993) and Sample and Arenal (1999). The most current scaling factors will be used, and the text and tables will be altered to reflect these most recent scaling factors. The following allometric conversion equations will be used instead:

$$\text{Birds: } TRV_{\text{receptor}} = TRV_{\text{test organism}} (BW_{\text{test organism}} / BW_{\text{receptor}})^{1-1.2}$$

$$\text{Mammals: } TRV_{\text{receptor}} = TRV_{\text{test organism}} (BW_{\text{test organism}} / BW_{\text{receptor}})^{1-0.94}$$

- 9. Comment:** Section G.1.2.2.6, Selection of Assessment and Measurement Endpoints, Page G-11, and Section 3.5.6.2, Problem Formulation, Page 3-32: "Direct exposure to soil" is considered a complete pathway, but lower-trophic-level receptors such as plants and invertebrates are not included as assessment endpoints. Please revise the SLERA to include an initial screening step that compares maximum site concentrations to readily-available media-specific screening benchmarks for plants and/or invertebrates.

Response: Although evaluated, the pathway is incomplete at OU-2B for the higher-trophic organisms evaluated in the ecological risk assessment or for plants or invertebrates because the site is paved and will likely remain so in the future. The document will not be revised to include an initial screening step that compares the maximum site concentration to readily-available media-specific screening benchmarks for plants and/or invertebrates.

- 10. Comment:** Section G.1.2.2.6, Selection of Assessment and Measurement Endpoints, Page G-11: This section does not present adequate justification for selecting the California ground squirrel while other small mammals are potentially present at the site which are threatened or endangered. For example, the Alameda vole appears to satisfy 2 out of the 3 criteria for selecting a measurement endpoint. Also, 4 special status fish are potentially present at this site, yet no marine receptors were selected. There are a number of special status species potentially present at this site (See Tables G-1 and G-2) which were not selected as endpoints. Please incorporate a discussion of special status species into the selection of assessment endpoints.

Response: The ground squirrel is readily found at Alameda Point and readily adapts to open areas in an urban setting. In areas where found, the ground squirrel has potential for exposure to soil contaminants. OU-2B is paved or has areas with minimal landscaping. It is not considered habitat for sensitive wildlife species and provides little or no habitat for urban wildlife. Indeed, there is little justification for evaluating any wildlife species on these sites. OU-2B does not extend into Seaplane Lagoon, therefore, fish species cannot be considered present at the site. The groundwater is evaluated against ambient water quality criteria as presented in the California Toxics Rule. These criteria are derived to be protective of the most sensitive aquatic species.

- 11. Comment:** Section G.1.2.3.1, Development of Exposure Estimates, Page G-14: The selected exposure factors are not sufficiently conservative in estimating risk in a screening-level evaluation. Please revise the

exposure estimates to incorporate the maximum ingestion rate, minimum body weight, and ingestion of 100% of the most contaminated food item for all receptors in order to comport with 1997 EPA ERA Guidance.

Response: See response to EPA General Comments on the Ecological Risk Assessment #2.

12. Comment: Section G.1.2.5, Uncertainties, Page G-21 and Section 5.5.3, Recommendations, Page 5-33: The statement that many assumptions used in the SLERA are conservative and result in an overestimate of risk is misleading. Please revise the uncertainties sections to discuss sources of uncertainty that could contribute to the underestimation of risk, and the statement that “risks are overestimated” should be removed from the ERA.

Response: Please note, this ecological risk assessment is not a SLERA. The uncertainty discussion will be revised to include the contributions of different aspects of risk assessment uncertainty and will provide risk managers with a realistic estimate of uncertainty.

13. Comment: Section 9.2.6.1, Chemicals of Potential Ecological Concern in Groundwater, Page 9-25: It is unclear which groundwater data was evaluated in the ERA. Section 3.5.6.1 states that groundwater data collected between 1994 and 2001 were used, yet Section 9.2.6.1 states that “the most recent groundwater sampling data” were used in the ERA. Please resolve this discrepancy.

Response: The groundwater data used in the ERA were collected between 1998 and 2002. Section 3.5.6.1 will be revised as appropriate.

14. Comment: Section 3.5.6, Ecological Risk Assessment Approach, Page 3-31, Section 9.2.6.3, Assessment Results for Groundwater, Page 9-25, and Section G.2.4, Results of the Ecological Risk Assessment for Marine Receptors, Page G-50: The approach used to evaluate exposure to chemicals detected in groundwater pose is not appropriate. Hazard quotients were calculated by dividing the measured concentration by a dilution factor of 10, but there is no technical justification or qualitative discussion to justify this dilution factor. The text on page 3-31 states that the use of a default dilution factor of 10 is suitable because “many of the groundwater monitoring wells are located more than 100 feet from the San Francisco Bay.” However, the ERA does not discuss the range of distances between wells and the shoreline, nor does it mention the extent of groundwater communication with surface water.

The justification for a dilution factor of 10 is not sufficient. The ERA should be revised to calculate Hazard Quotients for groundwater COPECs by directly comparing groundwater concentrations to the most conservative chronic surface water criteria without assuming a dilution factor. A qualitative discussion of the distance between groundwater wells from the shoreline, and tidal influence to groundwater can follow this original conservative screening step.

Response:

The Navy believes sufficient justification has been provided. The National Oceanic and Atmospheric Administration recommends the factor of 10. The ERA will be revised to provide additional information about the range of distances between wells, the areas of maximum concentrations, and the extent of groundwater communication with surface water.

RESPONSES TO DTSC COMMENTS (MIKE FINCH, R.G., SENIOR ENGINEERING GEOLOGIST I, GEOLOGIC SERVICES UNIT [GSU])

Comments and Recommendations

1. Comment: Because this is the third draft RI report prepared by TtEMI received within a two month interval, which appears to need significant revisions, we have decided to provide general comments on this report. The areas of concern for the OU-2B report are similar to the concerns and issues with the previous two draft RI reports. The site specific recommendations provided by GSU on the OU-1 and OU-2A Draft RI Reports in many cases will apply to the OU-2B Draft RI Report, as well.

Response: The Navy has developed a list of general changes that will affect OU-1, OU-2A, and OU-2B. The general changes that will be made to each document include the items in the bulleted list below.

- The purpose and objective of each environmental investigation will be defined in each site specific section.
- The results of site specific environmental investigations will be tabulated in a format similar to Tables 5-3 and 5-4 with minimum, maximum, and average concentrations, detection levels, and the PRG reference.
- The conclusions from each investigation, including the criteria used for comparison with the results of the investigation, will be discussed in the text.
- The nature and extent of TPH will be discussed in the text of the report. The extent of TPH, benzene, toluene, ethylbenzene, and xylene (BTEX), and lead will be discussed, and the conclusion of the TPH strategy will be summarized.
- A description of storm sewer cleaning and replacement will be included in the text.
- Data gaps will be identified and restated in the conclusions.
- The conclusions will include a more detailed discussion of the "point of departure" of 1 in a million cancer risk; any risk that exceeds 1E-6 will be advanced to the FS for risk management decisions.
- The potential issues with detection limits that did not approach the PRGs and were non-detect for most samples will be addressed in the data quality assessment sections for each site.

2. Comment: This report has not been signed by a registered technical professional. In accordance with state law and regulation, the report must be signed by either a California Registered Geologist or a qualified California Professional Engineer.

Response: The U.S. Navy is the lead agency on this RI report for a National Priority List site. Federal law does not require this report to be signed by a California registered geologist or professional engineer.

- 3. Comment:** It appears to the GSU that this document does not clearly distinguish between site characterization and risk assessment activities. By mixing the two processes together, it is difficult to determine if each site is adequately characterized in order to identify contaminants of potential concern (COPCs), conduct the risk assessments, and properly select contaminants of concern (COCs). The discussion of nature and extent of contamination for each site specific section should focus on all chemicals detected at the sites, not just chemicals believed to have been used at the site. That approach could lead to improper or incomplete identification of COCs. We fully understand that a great deal of data has been collected over the years. However, as currently presented, it is impossible to evaluate if each site has been adequately characterized, with respect to the lateral and vertical extent of contamination for each COC.

For VOCs in groundwater, we concur with the approach of resampling the data on an OU-wide, rather than site specific, basis.

Response: See the response to EPA global general comment 9.

- 4. Comment:** Separate figures should be provided for each chemical group to visually show the spatial distribution of sample locations and depths at which soil samples were collected for VOCs, SVOCs, pesticides, PCBs, and metals. Separate figures help review the adequacy of site characterization for risk assessment relative to existing and former industrial and physical features. In the site specific sections, the number of samples from each chemical group that were considered acceptable to describe the nature and extent of soil contamination is provided. However, only generalized information about all chemical groups combined is provided on most site specific figures for soil sampling locations. New figures should be provided for each chemical group separately, which show the specific analyses and sample depths conducted at each sample location. Only figures for PAHs in soil provide the spatial distribution of samples collected for that chemical group, and these are acceptable as provided. In addition, the new figures should include text boxes for each sample location point, and contain the detected concentration of all properly identified COCs, the detection limit achieved (if it was non detect), and the applicable rPRG or background threshold value.

Response: Figures that present the soil and groundwater sampling locations by analytical group will be added to the draft final RI report. Chemical concentrations and screening criteria will not be posted on the figures. Because of the number of analytes, the number of figures and tables would become overwhelming and would not present a concise picture of the sample location for the different investigations. RI results are presented in later sections, and the information requested by DTSC would not fit on one figure because of the quantity of data collected at the sites.

5. Comment: **There is a persistent problem with laboratory detection limits (DLs) that are greater than the U.S. EPA Region 9 Preliminary Remediation Goals (PRGs). The problem appears to be more prevalent with respect to soil gas and groundwater data. Discussion should be included at the beginning of each site specific section to point out the variety of reasons that may exist to explain why many DLs are greater than PRGs, and how this impacts the evaluation of the data, particularly with respect to those compounds that the Navy is reporting as non-detect (ND). In addition, justification should be provided about why these data are appropriate for use in an RI, or a re-sampling of selected soil, soil gas, and/or groundwater should be conducted, as needed, to address this issue.**

Response: The Navy disagrees that there is a persistent problem with the detection limits. Typically, detection limits that exceed the PRG would be a concern only for the risk assessment. The risk assessment included with this RI used a statistical technique to derive the EPC that was not vulnerable to "elevated" detection limits. See Appendices E and G for details on the calculation.

The majority of environmental samples collected and used in the RI report and the risk assessments were analyzed using standard EPA methods (such as SW-846 or the Certified Laboratory Program). Detection limits elevated over PRGs is the consequence of data collected over a period longer than 10 years, the evolution of lower detection limits as technology improves, the revision of PRGs over time (and which are not always technologically feasible to achieve), and matrix interference. Of these, only matrix interference should give concern that there would be a possibility that a chemical contaminant might be disregarded.

It is an unavoidable consequence that at least some detection limits will be elevated over PRGs whenever data are collected over a long time period. During the more than 10 years of sampling at those sites, lower detection limits were established for a number of chemicals as technology improved, and the PRG for some of those chemicals were also reduced based on new toxicological information. Therefore, it is clear that the original detection limits that prevailed before the new PRGs and detection

limits would exceed many of the new PRGs. In addition, current analytical methods do not achieve the detection limits necessary to support a number of the current PRGs, and matrix interferences within specific samples often prevent analytical methods from achieving the expected detection limits that normally can be realized under more ideal matrix conditions. Therefore, the detection limits necessary to support some PRGs are never achieved with modern analytical methods, and others cannot be achieved at sites where the recalcitrant matrix interferences are present in the sample media.

In addition, not all detection limits for the investigations were set to be below PRGs. For example, reporting limits were compared against maximum contaminant levels (MCLs) for groundwater data collected during the basewide groundwater monitoring investigations. Reporting limits for soil gas samples were not compared against PRGs according to the field sampling plan (FSP) for the supplemental RI data gap sampling investigation (Tetra Tech 2001). In addition, the report states that regulatory limits, such as PRGs for ambient air, are not applicable. See the response to EPA Site 6 specific comment 9. Detection limits will be more thoroughly addressed in the draft final RI report and more attention will be paid to instances where conditions may have resulted in less than optimal analytical conditions and the outcome in terms of data assessment.

Tetra Tech. 2001. "Final Field Sampling Plan Supplemental Remedial Investigation Data Gap Sampling for Operable Units 1 and 2."
June 14

6. Comments: **Data Assessment (Sections 5.3, 6.3, 7.3, and 8.3).**

(A) The method used to collect soil samples for VOCs should be identified in each site specific section for soil data assessment. If soil samples for VOCs were NOT collected using an Encore type sampler (U.S. EPA Method 5035), the characterization of VOCs in soil may be inadequate for risk assessment.

Response: Encore sampling was not used to collect any soil for analysis of VOCs. The soil samples for analysis of VOCs were collected before SW-846 Method 5035 was adopted.

(B) In the site specific sections for Data Assessment, Soil, (Sections 5.3.1, 6.3.1, 7.3.1, and 8.3.1), the statistical summary tables are referenced for the summary of the investigation results of soil samples collected. A column should be added to the table (next to the PRGs) to report each background value, or range of values, used for

comparing each metal at each site. Also, please note on the tables that the PRG values for soil are residential values.

Response: There are no station-wide background values to post on the tables. As presented in Section 3.5.2 of the RI report, data sets represent background conditions in soil for a specific area (pink, blue, and yellow) and a basewide background groundwater data set. Background is determined by a statistical comparison of these background data sets with the site data sets. It will be noted in the statistical summary tables that the PRGs are residential, and the bolded text will be defined as above the PRG.

(C) It is stated in the 2nd paragraph of each site specific section for Data Assessment, Soil, (Sections 5.3.1, 6.3.1, 7.3.1, and 8.3.1), that a subset of the soil data was selected for use in the risk assessments. Data were considered appropriate for use if they were validated, consistent with the DQOs, and reflected current site conditions. At this time, the GSU is unable to determine if soil data for all sites are representative of current site conditions with respect to the geologic and hydrogeologic characterization, and risk assessment. The spatial distribution of soil sample locations and depths for each chemical group relative to industrial and physical site features must be presented. Then, an evaluation can be conducted to determine if soil characterization is adequate to conduct a risk assessment.

Response: Figures that present the sampling locations by analytical group will be added to the draft final RI report. Chemical concentrations and screening criteria will not be posted on the figures. The results of the RI are presented in later sections, and the information requested by DTSC would not fit on one figure because of the quantity of data collected at the sites.

(D) In the site specific sections for Data Assessment, Soil Gas, (Sections 5.3.2, 6.3.2, 7.3.2, and 8.3.2), there appears to be a general lack of soil gas data. At Site 3, twelve soil gas samples were analyzed; at Site 4, eighteen samples were analyzed; at Site 11 no samples were analyzed, and at Site 21, four samples were analyzed. Plus, it is difficult to find soil gas sampling locations on the figures, and the number of locations sampled is different from the number of analyses conducted.

Additional soil gas sampling should be conducted to adequately characterize the variety of past industrial activities and waste disposal practices that occurred at these sites. A map of only soil gas sampling locations should be provided, which also shows cultural features, industrial features, and all sanitary and storm sewers present relative to the existing soil gas sampling locations. Information must also be provided about the depth and number of samples collected at each

location, the concentrations detected, the detection limits achieved, and the applicable PRG.

Furthermore, an OU-wide soil gas sampling plan should be developed and implemented to investigate soil gas in a systematic or gidded manner at all potential and previously identified source areas. Because the detection limits for many of the non-detected chemicals analyzed exceeded the PRGs, the data are insufficient to characterize the vadose zone and be used in an indoor air risk assessment. Relying on groundwater data to evaluate indoor air risk is not the preferred method for evaluating that pathway and conducting risk assessment. At a minimum, soil gas samples must be collected directly beneath buildings that will continue to be occupied for any reuse activity, industrial or residential.

Response: Soil gas was not used to quantitatively calculate risk; instead, it was used to support the risk from vapor intrusion calculated using concentrations in groundwater. These data were not collected to characterize the site for the nature and extent of contamination because they are not suited for evaluating the locations of sources or releases. This approach is consistent with the objectives presented in the "Final FSP Supplemental RI Data Gap Sampling for OU-1 and OU-2" (Tetra Tech 2001). In addition, data were collected for the shallow vadose zone and soil and groundwater; as a result, data for soil gas are not necessary to characterize the site. Furthermore, data for groundwater were used to assess risk from indoor air. It is unlikely that data for soil gas will change the outcome of the RI because the risk is already at the upper end of the risk management range from inhalation of indoor air.

Tetra Tech. 2001. Final FSP Supplemental RI Data Gap Sampling for OU-1 and OU-2. June.

7. Comment: In the site specific sections for Remedial Investigation Results, Background, (Sections 5.4.2, 6.4.2, 7.4.2, and 8.4.2), a list is provided for metals in soil at concentrations greater than background that may not be naturally occurring. The phrase, "may not be naturally occurring," should be removed from the site specific sections because it confuses the process of identifying COPCs. If a metal is greater than the established station-wide background value, that metal automatically becomes a COPC, and must be included in the risk assessment.

Response: The text will be changed from "Based on a comparison of the Site X soil data with the background data set for the pink area (Figure X-X), the following metals in soil at Site X are greater than background concentrations and may not be naturally occurring," to "Based on a

comparison of the data for soils at Site X with the background data set for the pink area (Figure X-X), the following metals in soil at Site X are not attributed to background.”

Although the text will be revised, the results of the risk assessment will not change because data for all metals, even those that were considered background, were included in the risk assessment. Only risk calculated from the background data set was subtracted from total risk from surface and subsurface soil to calculate incremental risk from surface and subsurface soils.

- 8. Comment:** In the site specific sections for Nature and Extent, (Sections 5.4.3, 6.4.3, 7.4.3, and 8.4.3), the term “Risk Driver” is used to describe how the characterization data will be presented. The document should clearly define what is meant by “Risk Driver.” It is unclear if the risk drivers have been determined through the CERCLA risk assessment process. If the term risk driver is meant to indicate a COC, then the term COC should be used in place of risk driver.

Response: The term “risk driver” is already introduced in this text as a chemical that poses significant risk to human health or the environment. It will be further defined in the draft final report as a chemical that poses a cancer risk above $1E-06$, an HI above 1, or an ecological risk considered significant or that could not be discounted.

- 9. Comment:** In the site specific sections for Nature and Extent, Chemicals Believed to Have Been Used at the Site (Sections 5.4.3.1, 6.4.3.1, 7.4.3.1, and 8.4.3.1), an embedded table is included in the soil subsection, which summarizes soil analytical results for chemicals used at each site. The GSU finds these embedded tables helpful in reviewing this section. We recommend adding a column containing the residential PRG, background value as appropriate, or other regulatory approved screening value. In addition, the sampling method used to collect soil samples must be reiterated in this section.

However, it is stated that these sections focus on those chemicals that were used historically, or “believed to have been used” at the site. Therefore, it is unclear if other chemicals may have been eliminated from consideration for soil risk because they were considered unrelated to past site activities. If this is correct, this must be more clearly explained in these sections. A complete list of COPCs as defined by the CERCLA process must be provided for each site. A COPC is any detected organic species and those inorganic species determined to exceed background concentrations. All chemicals on the list of COPCs should be retained for further evaluation through the risk assessment process, then eliminated or retained based on

those results. Finally, this approach is not compatible with DTSC policy, and with future community and residential reuse plans for many areas at Alameda Point. From the geologic and hydrogeologic characterization perspective, if the presence of a chemical at elevated levels is clearly documented, and the risk assessment determines a risk is present, then the chemical should be evaluated in the feasibility study (FS), especially if a risk is present for future community and residential activities.

Response: The PRGs and the maximum concentration detected in the background data set for metals will be added as a point of reference to each of the tables labeled "Chemicals Believed to Have Been Used at the Site". All chemicals above the PRG will be included in the nature and extent discussion. In addition, the background comparison was a statistical evaluation of data sets and not a comparison to a specific background value.

10. Comment: In the site specific sections for Nature and Extent, Risk Drivers (Sections 5.4.3.2, 6.4.3.2, 7.4.3.2, and 8.4.3.2), it is stated at the beginning of each section that numerous chemicals were detected at each site, but do not pose significant risk as defined by the risk assessments; therefore, the purpose of the section is to further characterize the nature and extent of chemicals driving risk at each site.

It must be clearly stated in this section if the selected subset of chemicals selected as "risk drivers" at each site includes all COCs as determined by the risk assessment process. If all COCs are not included in the discussion of nature and extent, a justification must be provided about why a particular chemical is not included. In addition, because the DLs for numerous analytes analyzed in soil were greater than the PRG value listed in the summary data tables, the possibility exists that these chemicals have not been adequately characterized and evaluated. Until the DL issues are justified or resolved, all COCs may not have been identified, and COCs selected.

Response: The nature and extent of all chemicals above PRGs will be discussed. The risk drivers determined by the HHRA and ERA will receive an expanded nature and extent discussion. As stated in previous comments, detection limits will be discussed in greater detail in the data assessment section of the RI.

General Comments and Recommendations-Groundwater

11. Comment: The OU-wide approach to assessing of groundwater presented in Section 9.0 appears to be a good approach to comprehensively

evaluate the lateral and vertical extent of individual COCs in groundwater. The inclusion of planar maps that show individual COC concentration contours, and cross sections that show vertical contaminant profiles, provides a good start for characterizing the nature and extent of the VOC plumes and beneath OU-2B. However, the lateral and vertical extent of all COCs is not clearly defined in several areas. In order to accurately evaluate risk and remedial alternatives, the characterization of groundwater must be complete. In addition, based on Section 9.2.4 – Fate and Transport, and Figure 9-30 – Dechlorination Degradation Pathways for Common Solvents, natural attenuation could likely be a part of future remedies proposed by the Navy. Therefore, the extent of VOCs in groundwater must be comprehensively understood to include natural attenuation in any remedy. The following general issues should be addressed to expand the current presentation of groundwater characterization data beneath OU-2B. As the process of evaluating this RI moves forward, additional issues may be identified during regulatory review of the next version of the report.

(A) Explain why all COCs for groundwater have not been shown on planar maps with contaminant concentration contours for review of lateral extent. For example, contaminant concentration contour maps have been prepared for TCE, 1,2-DCE, and others, but not for PCE, 1,1,2-TCA, 1,2-DCA, and others.

Response:

All COCs were shown on planar maps. Plumes were drawn only for COCs where concentrations were continuously detected across the site, such that plumes could be drawn. Plumes were not drawn for PCE, 1,1,2-TCA, or 1,2-DCA because there are sporadic detections across the site. If plumes were to be drawn for these constituents, they would be represented as several small circles around individual points.

(B) Planar maps of contaminant concentration contours for each COC in groundwater at several horizons bgs should be prepared to better evaluate the lateral and vertical extent of contamination. At a minimum, a set of shallow, medium, and deep Merritt Sand maps should be prepared to demonstrate the understanding of extent of contamination. Depth discrete groundwater data have been collected at numerous depths from the water table to greater than 60 feet below ground surface (bgs). Each COC must be bounded in every direction at a concentration that meets the regulatory approved screening criteria, which for VOCs is the tap water PRG. Although the Merritt Sand appears to be a continuous unit beneath OU-2B, there is enough depth discrete data to construct planar maps at multiple depth levels. With the current presentation of the data, it is most difficult to evaluate what is known about the lateral extent of each individual

COC throughout the vertical profile. The cross sections are extremely helpful, but only provide lateral and vertical extent information along two planes.

Response: Planar maps were not constructed at multiple horizons because detections from all levels were brought to the surface to depict the maximum horizontal extent of the plume. In addition, the location of the cross sections were chosen to demonstrate the maximum vertical extent of the plume through the most contaminated areas. Addition of multiple depth plan views for each contaminant would not provide any further understanding of the plumes. Information is adequate to assess the risk associated with the site and the volume of contaminants present in groundwater at the site. The additional planar plume maps will not be added to the draft final document.

(C) VOCs have migrated to depths of greater than 60 feet bgs, and the Second Water Bearing Zone (SWBZ) has clearly been impacted. The RI must plainly demonstrate that the vertical extent of contamination in the SWBZ has been bounded at all points beneath OU-2B.

Response: The Navy agrees that in all cases the maximum vertical extent of the plume has not been delineated to the PRG. A significant decreasing trend in concentrations can be observed in all cases such that mathematical methods such as linear interpolation can be used to describe the maximum extent of the plume. Furthermore, an aquitard exists at approximately 100 feet bgs that would confine the plume. Based on this information, the Navy believes information is adequate to assess risks and the nature and extent of contaminants associated with groundwater contamination at the site for the RI.

(D) The western edge of Site 22, and OU-2B, is directly adjacent to Seaplane Lagoon. The lateral and vertical extent of several VOCs has not been defined at this critical location, and chlorinated compounds appear to be discharging into Seaplane Lagoon and San Francisco Bay.

Response: If DTSC is referring to Site 21, the Navy agrees that chlorinated compounds appear to be discharging to Seaplane Lagoon.

(E) Nearly all the maps have some borings marked in red, and many others marked in blue. However, not one map key indicates why some of the boring location symbols are colored red. This information should be provided on the map legends.

Response: This information should be provided in the legend on the second and third line. The second line of the legend says "Red = Exceeds Screening

Level²,” and the third line of the legend says “Blue = Below Screening Level.” The figures will be checked to make sure the markings are appropriately identified.

(F) There are several locations where the extent of contamination for metals identified as COCs in groundwater is not defined. For example, the extent of arsenic in groundwater appears to be unbounded, particularly in the northern part of Site 3 (around M03-04), parts of Site 4, and to the north and east of Building 360. A concentration contour map would help to better understand the nature and extent of arsenic in groundwater. Plus, 105 analyses for arsenic were reported as NDs, which were greater than the PRG. Concentration contour maps for manganese, thallium, and other metal COCs, should also be provided.

Response:

The Navy agrees that arsenic does not appear to be fully bounded in groundwater at all locations. As stated in the text, elevated concentrations of petroleum hydrocarbons and chlorinated solvents have been observed in these areas and may be mobilizing arsenic from soil to groundwater. It is likely that arsenic in groundwater will partition to the soil once contaminant concentrations have been reduced. Arsenic should not be dismissed, but should be monitored in the future to evaluate whether concentrations decrease over time. As for the 105 analyses for arsenic that were reported as non-detect above the PRG, an ambient concentration of arsenic that exceeds the PRG exists in groundwater at Alameda Point; therefore, it is unrealistic to compare the non detected value to the PRG. Only seven nondetect concentrations exceeded the maximum ambient concentration of 40.7 µg/L. Of these, five are from monitoring wells with more recent data and where detection limits are below 40.7 µg/L. The remaining two samples were collected from Hydropunch locations in 1994. Detection limits will be discussed further in the draft final RI. The Navy does not feel that concentration contours maps for manganese, thallium, and other COCs should be drawn at this time; see comment number 11A under “general comments and recommendations – groundwater”.

12. Comment:

Section 9.1.1. It is stated in the 1st paragraph that a subset of the groundwater data was selected for use in the risk assessments. Data were considered appropriate for use if they were validated, consistent with the DQOs, and were representative of current site conditions. At this time, the GSU is uncertain if groundwater data are representative of current site conditions, with respect to geologic and hydrogeologic characterization, and risk assessment. The issue concerning numerous detection limits greater than the PRGs must be better justified, explained, and resolved, particularly for VOCs, like

tetrachloroethene (PCE), trichloroethene (TCE), vinyl chloride, 1,2-dichloroethene (1,2-DCE), 1,2-dichloroethane (1,2-DCA), 1,1,2-trichloroethane (1,1,2-TCA), benzene, benzo(a)pyrene, and arsenic. For example, in Section 9.2.3.2 – Risk Drivers – PCE, it is stated that PCE was detected in 41 out of 1,537 samples collected and analyzed. However, the text should also note that according to Table 9-2, the analysis of 1,218 samples for PCE were reported as non-detect (ND) with the DL greater than the tap water PRG. Similar numbers of samples were reported as NDs with DLs greater than the PRG for numerous VOCs found in groundwater at OU-2B. Therefore, as the data is currently presented, it is difficult to be certain if the lateral and vertical extent of chemicals in groundwater have been adequately characterized in the First Water Bearing Zone (FWBZ) and SWBZ.

Response:

Detection limits will be more thoroughly addressed in the draft final RI. In addition, statistical summary tables by investigation will be added to the draft final RI report, which should make it easier to identify the reporting limits across time. It is an unavoidable consequence that at least some detection limits will be elevated over PRGs whenever data are collected over long periods, as they were for the OU-2B sites. During the more than 10 years of sampling at those sites, lower detection limits were established for a number of chemicals as technology improved, and the PRGs for some of those chemicals were also reduced based on new toxicological information. Therefore, it is clear that the original detection limits that prevailed before the new PRGs and detection limits were introduced would exceed many of the new PRGs. In addition, matrix interferences within specific samples often prevent analytical methods from achieving the detection limits that normally can be achieved under more ideal conditions. Therefore, the detection limits necessary to support some PRG are never achieved with modern analytical methods, and others cannot be achieved at sites where recalcitrant matrix interferences are present in the sample media.

13. Comment:

Section 9.2.4 – Fate and Transport. The general objectives of the fate and transport evaluation are to determine if: (1) chemicals have migrated or degraded; (2) are being released from a continuing source of contamination; or (3) likely to be transported through groundwater or other potential pathways. The primary recommendation for groundwater is for further evaluation in an FS. If the Navy plans to propose natural attenuation as a part of any remedial alternative, the occurrence of natural attenuation must be comprehensively demonstrated. This demonstration must provide multiple lines of evidence shown by chemical data from repetitive groundwater monitoring and/or repetitive soil sampling events, and graphical displays as described below. Statements made that suggest

the possible occurrence of natural attenuation, must be justified in a comprehensive manner. The multiple lines of evidence must prove that degradation pathways result in harmless end products. Multiple lines of evidence should include, but not be limited to:

- a. Documentation of Sequential Degradation and Loss of Contaminants as shown by concentration trends, plume geometry, plume lengths vs expected lengths, and/or mass balance calculations;
- b. Documentation of the Presence of Geochemical and Inorganic Indicators of Contaminant Degradation as shown by temperature, pH, conductivity, dissolved oxygen, oxidation-reduction potential, sulfate/sulfide, nitrate/nitrite, ferrous iron, ethene, ethane, methane, carbon dioxide, and/or chloride; and
- c. Documentation of Microbial Evidence, such as anaerobic and aerobic heterotrophs and degraders (if present), and/or inorganic reducers.

The demonstration of natural attenuation has not yet been attempted for Sites 3, 4, 11, and 21. However, these are the kinds of evidence that must be compiled to support the occurrence of natural attenuation.

Response:

The criteria DTSC enumerated are especially relevant if it must be demonstrated that "natural attenuation" will be a viable remedial option for a new spill. The solvent releases at Alameda Point are more than 10 years old. Therefore, the presence of degradation products such as 1,2-DCE and vinyl chloride are considered sufficient evidence that biogeochemical conditions are present and degradation processes are active. The Navy agrees that these are not sufficient conditions to demonstrate that a specific remedial goal will be met. Therefore, "attenuation" will be revised to "degradation" in the RI report. The intent of the RI report was to state that the degradation process is occurring. If monitored natural attenuation is considered as a remedial alternative, this process would be demonstrated in the FS and not in the RI report.

General Comments and Recommendations- Other

14. Comment: Executive Summary. The GSU recommends that the process for identifying COPCs, selecting final COCs be better described. As currently presented in the ES and in the site specific sections, enough detail has not been provided for a reviewer to understand exactly how a COPC was identified, a COC was selected, a risk driver was determined, and why selected chemicals were further evaluated.

Some reviewers only look at the ES, and therefore, the COPC and COC selection process must be clearly presented in the ES.

The only reference to the COPC process in the ES is found in the 2nd paragraph on page ES-2. It is stated that chemicals in soil or groundwater were excluded as COPCs based on three criteria: essential nutrient status; frequency of detection; and PRGs. Details must be provided about how COPCs are selected, not eliminated. It appears that all COPCs are not being carried forward into the risk assessments, which is how the decision is made to either retain or eliminate a COPC. Finally, the GSU recommends a summary table be added to the ES to clarify the description of the COPC and COC selection process.

Response: The intent of the executive summary is to recap the general approach and conclusions, and not to present in detail exactly how the RI was conducted. These details are presented in the main body of the report and appendices. The Navy cannot provide the level of detail requested by DTSC in the executive summary because it would become too lengthy and would no longer be a summary.

The selection of COPCs, chemicals of potential ecological concern (COPEC), risk drivers, and COCs is described in Section 3.0, RI Approach, and is consistent with EPA guidance. In the draft RI report, the COPC selection is presented in Section 3.5.5.2, the COPEC selection in Section 3.5.6.1, and the selection of COCs in Section 3.6.

15. Comment: Executive Summary. The end of the ES presents bulleted recommendations for Sites 3, 4, 11, and 21. The proposals for further evaluation, no further action (NFA) for soil, selected actions for certain chemicals in some areas, and the OU-wide groundwater plume is difficult to follow in the bullet format used. The GSU recommends a matrix also be used to summarize the recommendations for each site, each media, and the OU-wide groundwater plume. This would also make it easier to compare recommendations proposed for each site.

Response: The information will be provided in table format.

16. Comment: Section 3.4 – Data Quality Objectives (DQOs). Subsections 3.4.1 through 3.4.7 provide a written description of the general DQOs as they apply to all four sites contained in this RI. The GSU recommends that site specific DQOs be added in tabular form to each site specific section (Sections 5.0 through 9.0). General DQOs suggest that the problem to be solved for soils at the four sites and groundwater OU-wide is exactly the same. It also suggests that

COPCs and COCs in soil at all four sites and groundwater OU-wide are the same, which is not the case. This section does not provide an accurate statement of the problem and other DQOs for each site and groundwater OU-wide. The use of site specific DQOs would give a clear, concise picture of which groups of chemicals are considered to be the problem at each site in soil gas and soil, and in groundwater OU-wide. Site specific information should also be provided for all other steps in the DQO process for each site.

Response: The site-specific results of applying the DQOs to Sites 3, 4, 11, 21 and the OU-wide groundwater plume and a specific discussion of the quality and quantity of data collected at each site are presented in the site-specific sections (see Section 5.3, 6.3, 7.3, 8.3, and 9.1). In addition to this text in the draft RI report, figures that present the sampling locations by analytical group will be provided in the draft final RI report. Furthermore, the site-specific conceptual site model (CSM) text will be revised to present the chemicals in soil and groundwater that are considered of concern at each site.

17. Comment: Section 3.5.3 – Nature and Extent Approach. At the end of this section, it is stated that the screening level for metals in soil and groundwater are based on the maximum metal concentrations detected in ambient soil and groundwater. It must be clarified in this section how the phrase “metals present at concentrations greater than background” is different from the phrase “maximum metal concentrations detected in ambient soil and groundwater.” In each site specific background discussion section, a table should be provided listing concentrations for background values established by the statistical comparison process (for each metal in soil at each site), and the screening level based on the maximum concentration detected in ambient soil. If our understanding is correct, the screening level will remain the same for all sites, based on the Tetra Tech, 1997 and 1998, Technical Memoranda. The background values will change for each metal at each site, based on the statistical comparison. Finally, if this is correct, justification must be provided for using the screening value instead of the metal and site specific background value to determine which metals are COPCs.

Appendix E – Background Soil and Groundwater Determination. For each metal listed as greater than background in the site specific sections, the GSU recommends the following information be presented. The frequency distribution and normal probability plots for each metal in the site and the background data set should be provided in order to, at a minimum, visually evaluate that the two populations are different.

Response:

The Navy cannot make the revisions requested by DTSC because the background comparison is not used to select COPCs. The COPCs are selected as a part of the HHRA process. As is stated in Section 3.5.2 of the RI report, "This comparison identified which metals in soil or groundwater at the sites potentially resulted from historical site activities and which metals in the soil or groundwater were naturally occurring (background)." The results of the background comparison are used (1) to support the nature and extent evaluations and focus the discussions toward chemicals related to site activities, and (2) to establish the portion of the total site risk that is contributed by background concentrations of metals. In addition, as stated in the NCP in Title 40 Code of Federal Regulations (CFR), Part 300.400(b)(1), chemicals that are naturally occurring in soil or groundwater generally are not cleaned up under CERCLA (EPA 2000).

Appendix E will be updated to include box plots that compare the background data set.

RESPONSE TO RWQCB COMMENTS

General Comments

1. **Comment:** For all four sites, the draft RI used detection limits greater than the previously agreed upon preliminary remediation goals (PRGs) for soil, groundwater, and soil gas monitoring. Some of these detection limits were also greater than standard laboratory reporting limits. As a result, many chemicals of concern were reported as "not detected (ND)" and removed from further risk evaluation. This invalidated many risk evaluation conclusions. Please conduct additional data gap sampling using appropriate detection limits.

Response: Detection limits will be more thoroughly addressed in the draft final RI. The Navy does not believe that there is a problem with the data. Many of the analytical methods that were used over the past 10 years, when much of the samples at these sites were collected, have since been superseded because they were not capable of the detection limits that are needed for comparisons with many of the recently established PRGs. Chemicals were not excluded as chemicals of potential concern (COPC) in the HHRA if detection limits were elevated and the chemical was believed to be related to site use. In such cases, the value of the detection limit was used to develop the exposure point concentration for the HHRA.

2. **Comment:** On all sites the aquatic ecological risk assessments were incomplete. The storm sewer bedding material pathways were not evaluated. The draft RI recognized that many of the storm sewers are in groundwater and have breaks and leaks that need to be repaired. Yet the draft RI contained no discussion on the potential for the storm sewer bedding material as a preferential discharge pathway to Sea Plane Lagoon. Please include a discussion of the storm sewer bedding as a preferential pathway.

Response: The Navy evaluated the storm sewer corridor, which is documented in the "Data Summary Report Supplemental Remedial Investigation Data Gap Sampling for Operable Units 1 and 2" (Tetra Tech 2002). Geotechnical samples were collected from storm sewer bedding and native surrounding soil at 15 locations across the base, including four locations at Sites 4 and 21. Based on the geotechnical analysis of the soil collected from storm sewer bedding and of samples collected 20 feet from the storm sewers from native soil, storm sewer bedding does not differ greatly in hydraulic permeability or porosity from native soil. This similarity suggests that imported bedding material was not used during the construction of these storm sewers. Additional text on the storm sewers will be added to the draft final RI report.

Tetra Tech. 2002. Data Summary Report Supplemental Remedial Investigation Data Gap Sampling for Operable Units 1 and 2, Alameda Point. July 25.

3. **Comment:** For sites where there are direct groundwater discharges into Waters of the State, California Toxics Rule salt water and human health criteria for the consumption of organisms should be used in ecological and human health risk assessment.

Response: The Navy will compare contaminant concentrations in groundwater at OU-2B closest to Seaplane Lagoon with the California Toxics Rule criteria to evaluate whether groundwater potentially discharging to Seaplane Lagoon exceeds the criteria. If contaminant concentrations in groundwater at OU-2B exceed the California Toxics Rule criteria, groundwater discharging to Seaplane Lagoon will be recommended for further evaluation in the FS for OU-2B. Groundwater (including the portion of the plume near Seaplane Lagoon) has been recommended for further evaluation in the FS based on risk to human health.

Specific Comments

1. **Comment:** Page 5-12, Section 5.3.1 Data Assessment – Soil, Fourth Paragraph and Page 8-13, Section 8.3.1 Site 21 Data Assessment – Soil, Fifth paragraph: Both paragraphs state “although minimal data were available for VOCs in soil from 0 to 2 feet bgs, this is not perceived as a data gap because most of the site is paved and VOCs in surface soil likely would volatilize and no longer be present in the soil at the site” Staff agrees with the statement that volatilization of VOCs does occur in non-paved area. However, future use for Site 3 includes commercial/industrial uses that would require the removal of the paved surface. It is important to collect data from the paved area to determine risks for these futures uses scenario. Please conduct additional VOC sampling in soil from 0 to 2 feet bgs.

Response: Based on the CSM, is unlikely that VOCs would be detected in soil from 0 to 2 feet bgs. Because the site is paved, it is unlikely that VOCs spilled on the pavement would infiltrate into the ground, but would instead be more likely to volatilize from the pavement. Thus, the Navy does not consider this issue to be a data gap. The text will be revised to clarify this information.

RESPONSES TO RAB FOCUS GROUP COMMENTS (LEA LOIZOS, ARC ECOLOGY)

General Comments

- 1. Comment:** The groundwater plume of volatile organic compounds that extends beneath the entire operable unit is over 1600 feet in length and reaches up to 77 feet deep at points. Concentrations of TCE are as much as 200,000 ppb. As far as we can tell, the plume extends into the Seaplane Lagoon, creating an on-going violation of the Clean Water Act. The potential health hazards for current and future users of this area, as well as for aquatic species in the Lagoon are substantial. It is unfortunate that only now, after 10 years of cleanup at Alameda Point, the Remedial Investigation for this site is being conducted. We believe that OU-2B should be given higher priority in the cleanup schedule. The Navy should address the potential need for a removal action to mitigate the hazards from the plume while the final remedy is being developed.

Response: The risks to human health and the environment have been identified, and the plume is being evaluated for remedial action in the feasibility study. The desire for a removal action prior to final remediation is noted.

- 2. Comment:** Background –

a. We have concerns regarding the data set that was used to establish background levels of metals at Alameda Point. Specifically, it appears as though many of the samples taken to establish background levels were taken within what are now IR Sites. Please provide an explanation of how the sites were chosen for the background study and what assurances we have that these data are truly representative of background.

b. It appears as though the same data set is used to determine background for the original island soils (i.e., pre-1887) and the soils that were filled from 1942-1946. Please provide an explanation of how it was decided that two very different soil areas have similar background concentrations of metals.

c. Regarding background levels for arsenic, Craig Hunter reported at our meeting that these levels are typical for soil/rock in the East Bay hills and that the concentrations at Alameda Point reflect those of alluvial deposits from these hills. Can data and references be provided that support this explanation?

d. There are several references made to “ambient” levels of polynuclear aromatic hydrocarbons (PAHs) in the document. The community has never agreed to an ambient level of PAHs, nor have

the regulating agencies to the best of our knowledge. PAHs are not naturally occurring in the environment, as they are generally created through human activity. Therefore, we believe that levels of PAHs should never be considered as ambient and we request that any such references be removed from the document. Furthermore, as part of the community acceptance criteria of the NCP, the final cleanup level for PAHs should be based on health risk and be developed with community input.

Response:

a. Some of the data used to establish the background data set are from within the boundaries of the CERCLA sites. However, these sampling locations were believed to be unaffected by site activities. Details on construction of the background data sets are provided in Appendix E of the draft RI report. The background metals data sets for soil and groundwater and the methodologies used to establish background were approved by the agencies in 1996 (Navy 2002).

b. Background soil data were selected based on locations that were least affected by activities at the site. The widest range of sampling locations was chosen to obtain the best data set. Because some activities occurred on unfilled land or land with minimal fill, background samples were included from these locations.

c. The description of regional geology in the draft RI (Section 2.3.1) discussed the origin of sediments. According to Figuers (1998), some of the sediments in the San Francisco Bay originated from the erosion of surrounding hills. The document entitled *Analysis of Background Distributions of Metals in the Soil at Lawrence Berkeley National Laboratory* states: "Typical mean background concentrations of arsenic in Bay area soils ranges from approximately 5 mg/kg to 20 mg/kg, with some soils containing up to 40+ mg/kg arsenic". The citation for this document is:

Figuers, Sands. 1998. "Groundwater Study and Water Supply History of the East Bay Plain, Alameda and Contra Costa Counties, CA." Prepared for Friends of the San Francisco Estuary. June 15.

Analysis of Background Distributions of Metals in the Soil at Lawrence Berkeley National Laboratory: University of California (Berkeley), Lawrence Berkeley Laboratory, June 2002.

d. Text on ambient levels of PAH will be further clarified in the draft final RI report. The Navy agrees that PAHs are generally created through human activity. At Alameda Point, PAHs are related to the marsh crust, which was formed by the discharge of petroleum waste from two gas plants and an oil refinery. However, PAHs are also found in the sediments

of San Francisco Bay which were used as site fill for Alameda Point. Therefore, ambient concentrations of PAHs at the base are not related to activities conducted at the CERCLA sites. No further action is recommended for PAHs when PAHs are within the risk management range at Sites 3, 4, 11, and 21. PAHs are already addressed by a record of decision and remedial action plan (ROD/RAP) addressing PAHs found at depth at Alameda Point/FISC Annex, and any further evaluation would consider institutional controls.

Navy. 2002. Alameda Point Sites 14 and 15 Risk Assessment Meeting Summary. April 24.

3. Comment:

Human Health Risk Assessment (HHRA) –

- a. We are pleased to see that the risks from soil and groundwater have been added together in this RI to produce a total site risk.
- b. All sites found to have a carcinogenic risk above 1×10^{-6} or a non-carcinogenic hazard quotient above 1 should be carried forward to a Feasibility Study to allow community input on an appropriate remedy for the site.
- c. It is unclear why only a portion of the available data set was used in the HHRA. We have not bothered to conduct a thorough review of the HHRA, however judging by the amount of validated data collected for these sites that was left out of the risk assessment, it is clear that the HHRA is insufficient as prepared. Saying that the data does not meet the data quality objectives for this investigation is not an acceptable response. A more thorough explanation of why such a large percentage of available data was left out of the HHRA is required.
- d. The risk from all chemicals of concern should be evaluated in the HHRA, not just those seen as risk drivers.
- e. According to Section 3.5.5.3, page 3-23, "Given the scarcity of San Francisco Bay Area residential land, projected redevelopment reuse at Alameda Point is not likely to include land-intensive pathways, such as residential gardening." We disagree with this statement and other arguments given for not including the homegrown produce consumption pathway in the risk assessment. All of the sites included in this RI have at least a portion of the site slated for residential or mixed re-use in the redevelopment plan, meaning residences are possible at all sites. It is inappropriate at this time to make assumptions about the availability of land for gardening in these areas. The health risks associated with the consumption of homegrown produce at these sites needs to be included in the risk assessments.
- f. Please explain why dermal contact with groundwater and inhalation of vapors in a trench are not considered complete exposure

pathways for a construction worker. Considering the high level of VOCs in groundwater at OU-2B, we believe these pathways should be evaluated.

Response: a. The Navy acknowledges the comment.

b. All sites that pose an incremental carcinogenic risk above $1E-06$ or a noncancer HI above 1 are addressed in the FS. A risk management decision may be made for no further action if human health risk estimates for chemicals related to site activity are within the risk management range. This approach is consistent with EPA guidance (EPA 1991), which recommends, "where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than $1E-04$ and the non-carcinogenic hazard index [HI] is less than 1, action generally is not warranted unless there are adverse environmental impact. If MCLs [maximum contaminant levels] or non-zero MCLGs [maximum contaminant level goals, which are used to evaluate drinking water] are exceeded, action generally is warranted."

EPA. 1991. Memorandum Regarding the Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions. OSWER 9355.0-30. April 22.

c. The Navy will include a table and text explaining how the data reduction was completed.

d. All chemicals were evaluated in the HHRA including chemicals of concern.

e. Future hypothetical ingestion of homegrown produce will be evaluated.

f. Construction workers would dewater the trench and would not be working in the groundwater. Although construction workers may come in transient contact with groundwater, this exposure was considered insignificant because of the short duration and limited extent expected. The risk assessment is evaluating an inhalation exposure for the construction worker.

4. **Comment:** We are greatly concerned about the possible risks from exposure to indoor air for those working in buildings located over the plume. Several buildings on OU-2B, including 162, 163, and 398 are occupied and are above the VOC plume. Has any indoor air sampling been done to assess the health risks posed to these workers? Have they been informed of the existence of a VOC plume beneath their building and

the possible risks from inhalation of indoor air? It is imperative that the health and safety of those working in these buildings be the first priority in determining a remedy for this area.

Response: The Navy is preparing an information sheet to notify occupants of buildings in OU-2B at this time.

5. **Comment:** Throughout the document, there are references to the “action level” of 0.62 mg/kg for PAHs (e.g., Section 7.5.1, page 7-28). Please be reminded that the community has not agreed to this action level. We understand that this screening level was developed by the BCT to put an end to the background/ambient discussion and to facilitate the cleanup process. We expect, however, that the final cleanup level for PAHs will be based on health risk and will be developed with community input.

Response: Comment noted.

6. **Comment:** Future Land Use – The “future land use” descriptions for Sites 3, 11, and 21 all include the following statement: “Housing could include artists’ lofts, apartments for low- to moderate- income families, and townhouses consistent with Measure A and the City Charter (Navy 1999a).” As of now, no plans for the types of housing on Alameda Point have come before the public. We do know that there can only be single-family and duplex housing and each lot must have 2000 square feet per unit; townhouses are not allowed. Until housing plans are finalized, the cleanup should not make assumptions about the types of housing that will be available nor the amount of land associated with each unit.

Response: Please note this description is based on the land use plan submitted by the reuse authority to support its application for transfer of the property to the reuse authority. The RI does not consider potential cleanup actions and the risk assessment is conducted as if no cleanup has occurred. In addition, the risk assessment makes no assumptions about the potential land use other than to broad categories such as residential, commercial/industrial, construction worker, and recreational.

7. **Comment:** Please include a table of the specific data quality objectives for this investigation in the document.

Response: The RI report is a compilation and evaluation of data from numerous investigations, many conducted before the formal DQO process had been established. The DQOs for each investigation, if any, are provided in the

documents that specifically summarize each investigation. The DQOs specific to the RI report are presented in Section 3.4 of the draft RI report.

8. **Comment:** Please include a detailed summary of the pilot studies and removal actions conducted at each of the sites, as appropriate, including a summary of the results thus far. In order to gain a complete understanding of what is happening at this operable unit, please include actions taken under both the CERCLA and TPH programs.

Response: A summary of the pilot studies and removal actions for TPH will be added to the sections on the TPH investigation. Figures will not be provided because the TPH removal actions do not pertain to CERCLA actions. CERCLA removal actions will be included as investigation summaries.

Site-specific Comments

Site 3

1. **Comment:** Lead in Soil and Groundwater – A more thorough discussion/investigation of the source of the lead in soil and groundwater at Site 3 is needed.

It seems like more than coincidence that the elevated levels of lead in the soil are directly above the lead groundwater plume. The report references geochemical data that show basic conditions in both the soil and groundwater. Therefore, according to the report, the lead in soil should be stable and it is unlikely that lead will migrate. While this may be true, it does not provide an explanation for the plume of lead in the groundwater.

The document also states, "It is unknown if the storm sewer in this area is in contact with groundwater or not, but during the Storm Sewer investigation a significant sag was found directly west of the manhole 6H-5" (pg. 5-20). However there is no discussion of further investigations to determine if the storm sewer is acting as a conduit. More information is needed.

Finally, there is very little discussion of the source of the lead in the soil.

Please provide a more thorough explanation of the source of the lead in both soil and GW at Site 3.

Response: The Navy agrees that a thorough explanation of the source of lead in soil and groundwater is not included in the text. This information is not available based on current data. The Navy believes

lead in soil and groundwater is delineated adequately for remedy selection. .

2. **Comment:** Section 5.4.4, Fate and Transport – This section, as written, does not satisfy the stated purpose to “determine whether chemicals driving risk at Site 3 [...] (1) have migrated or degraded, (2) are being released from a continuing source of contamination, and (3) are likely to be transported through groundwater or other potential pathways.”
- a. There is no discussion of the potential for arsenic, lead, or PAHs in soil to be transported by wind. Please include a discussion of this potential pathway.
- b. The assessment of migration is based on geochemical data only; there are no long-term sampling data provided that show migration or degradation trends of the lead in groundwater. A more thorough discussion of migration and degradation potential needs to be provided, including sampling data that show the plume over time.

Response:

a. The Navy agrees there is no discussion of the potential for arsenic, lead, or PAHs in soil to be transported by wind. This discussion was not included because transport of soil by wind is thought to be an incomplete pathway. Site 3 is primarily paved and the one area that is not paved has been landscaped with grass and is well maintained; therefore, minimal transport of soil by wind will occur.

b. The Navy agrees that data from monitoring wells are needed to show concentrations of lead in groundwater over time. The Navy believes lead in soil and groundwater is defined adequately for remedy selection in the FS. The FS will contain specific recommendations for addressing additional data needs if required.

3. **Comment:** We are pleased to see that the soil and groundwater will both be evaluated further in the feasibility study (FS). It is unclear, however, why lead is the only chemical of concern listed for soil in the final recommendations. Section 5.5.2.1, page 5-32, states, “Based on the background comparison, arsenic is statistically different from background; however, there is no known source or spatial pattern for the sampling locations where elevated concentrations were detected.” This type of logic is unacceptable. While the Navy is not required to remediate metals that are at or below background, metals that are clearly above background should be evaluated for remediation, whether or not a source or pattern is discernable. Removal of these hot spots may prove to be a very cost effective way of significantly reducing the health risks posed by the site.

Section 5.5.2.1 goes on to say, “Because of the use of sediments to construct the base, an ambient concentration of PAHs also exists at

Alameda Point.” Please see comment 1b regarding the RAB’s concerns with “ambient” levels of PAHs. Furthermore, Section 5.4.3.2 acknowledges that “Elevated PAH concentrations at depths of less than 4 feet bgs around the former USTs likely are related to petroleum releases that occurred from the USTs or from activities related to the refueling of aircraft trucks” (page 5-20). We urge the Navy to evaluate remedies for all chemicals of concern in soil at Site 3 in the FS.

Response: In the Draft Final RI arsenic and PAHs will be recommended for further evaluation in the FS.

- 4. Comment:** Figure 5-11: The groundwater plume boundaries do not match the sampling data provided.

Response: The Navy agrees that the boundaries of the plume do not match the data. Figure 5-11 will be updated to reflect the correct boundaries.

Site 4

- 1. Comment:** Section 6.4.4, Fate and Transport – This section, as written, does not satisfy the stated purpose to “determine whether chemicals driving risk at Site 4 [...] (1) have migrated or degraded, (2) are being released from a continuing source of contamination, and (3) are likely to be transported through groundwater or other potential pathways.” There is no discussion of the potential for arsenic, cadmium, copper, or PAHs in soil to be transported by wind. Please include a discussion of this potential pathway.

Response: The potential for arsenic, cadmium, copper and PAHs in soil to be transported by wind was not discussed because the site is currently paved. In the future, it is unlikely that sufficient soil would be exposed to pose a hazard via wind.

- 2. Comment:** There has been some concern about the risk to children playing soccer on the field located within Site 4. While most detections of PAHs were below the screening level, the screening level of 0.62 mg/kg is above the PRG of 0.062 mg/kg for benzo(a)pyrene. There was also a detection of copper in surface soil at twice the screening level. This may be considered an isolated hit, but there was very limited sampling done in this area. Please include an analysis and discussion of the current risk to children who play on this field and whether or not more sampling is required.

Response: Copper does not present risk to human health based on the HHRA; it presents risk to ecological life, however. Thus, there should not be a concern about risk from copper in soil at Site 4. In addition, PAHs are present at two sampling locations within the soccer field. These samples were collected from 0 to 2 feet bgs and 4 to 8 feet bgs, and the results for the samples collected in the intervals closer to the surface at these locations are well below the screening level of 0.62 mg/kg. The text in the draft final RI will be revised as appropriate to include this information. Also, please note the PRG is based on a residential exposure assumption that assumes a child/adult lives at the site for 30 years and is continually exposed to the soil.

3. **Comment:** We disagree with the recommendation to not evaluate soil at Site 4 further in the FS. See General Comments 1b and 2a.

Response: Soil at Site 4 will be recommended for further evaluation in the FS based on potential risk above 1E-06.

Site 11

1. **Comment:** Section 7.4.4, Fate and Transport – This section, as written, does not satisfy the stated purpose to “determine whether chemicals driving risk at Site 4 [...] (1) have migrated or degraded, (2) are being released from a continuing source of contamination, and (3) are likely to be transported through groundwater or other potential pathways.” There is no discussion of the potential for copper, lead, or PAHs in soil to be transported by wind. Please include a discussion of this potential pathway.

Response: The potential for copper, lead, and PAHs in soil to be transported by wind was not discussed because the site is currently paved. Furthermore, copper does not pose risk to human health; it poses a risk to ecological receptors that live in soil. Lead was detected only at one sampling location at a concentration above the screening criterion of 165 mg/kg; the concentration at this location was 242 mg/kg., thus exposure to soils at Site 4 would not pose a risk.

Groundwater Plume

1. **Comment:** Please include a map that shows the TPH plume in relation to the VOC plume.

Response: The Navy will include a map in Section 9.0 of the RI report that shows the plumes of TPH in groundwater at OU-2B.

2. **Comment:** Why is groundwater data used to determine indoor air concentrations rather than actual indoor air samples from buildings located over the plume? We understand that most of the soil gas data could not be used because of the high detection limits from those samples. However, it is unclear why no indoor air samples have been taken from structures above the plume to evaluate risk from exposure to indoor air, especially considering the fact that some of these buildings (e.g., Buildings 162, 163A, 360) are currently being leased.

Response: A risk has been identified for existing buildings based on the RI data that were collected to assess indoor air; therefore, it is unlikely that additional indoor air monitoring is needed to identify the need for remedial action.

3. **Comment:** The summary of the ecological risk assessment provided in Section 9 is insufficient. Please provide a more thorough explanation of how the hazard quotients for TCE, chromium, and nickel were derived, including the screening criteria that were used.

Response: A more detailed explanation of how the hazard quotients for TCE, chromium, and nickel were derived will be included in the draft final RI. The screening criteria that were used will also be elaborated in the text.

Minor Comments

1. **Comment:** Section 8.1.1, page 8-4: There is a reference made to former NADEP employee Lyn Stirewalt. The report refers to the employee as Mr. Stirewalt. Assuming this is the same Lyn Stirewalt who sits on the Alameda Point RAB, please correct the gender reference.

Response: An effort will be made to contact Lyn Stirewalt to determine if she was a former NADEP employee that was interviewed regarding Building 398. If so the text will be corrected to Ms. Lyn Stirewalt.

APPENDIX K
AERIAL PHOTOGRAPHS



AV11-3/24/1947



AV253-5/3/1957



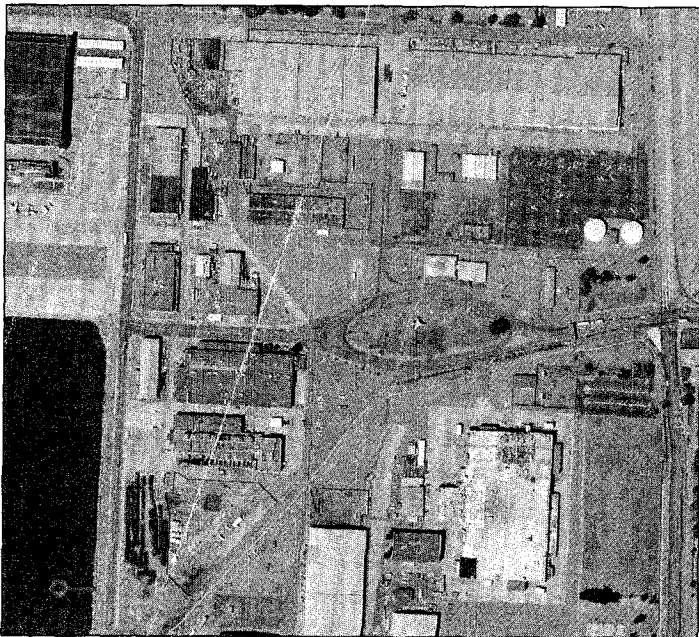
AV902-5/19/1969



AV1193-5/29/1979



AV3268-3/30/1998



AV5200-8/16/1996

APPENDIX L
RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT
FINAL OU-2B REMEDIAL INVESTIGATION REPORT

RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT FINAL OU-2B REMEDIAL INVESTIGATION REPORT, SITES 3, 4, 11, AND 21, ALAMEDA POINT, ALAMEDA, CALIFORNIA

This document presents the U.S. Department of the Navy's (Navy) responses to comments from the California Department of Toxic Substances Control (DTSC), on the "Draft Final Remedial Investigation (RI) Report, OU-2B, Sites 3, 4, 11, and 21, Alameda Point, Alameda, California," dated May 16, 2005. The RI report became final on June 16, 2005. The Navy received the comments addressed below from DTSC's Geologic Services Unit (GSU) on June 21, 2005.

RESPONSES TO DTSC COMMENTS

General Comments

- 1. Comment:** GSU noted several deficiencies in the draft RI report that were not adequately addressed in the draft final RI document. In general, it is not possible to fully evaluate the adequacy of OU-2B soil and groundwater characterization based on the data evaluation and presentation contained in the draft final RI report. Several data gaps have been identified for each of the IR sites and for OU-wide groundwater. However, GSU cannot agree that data gaps determined by the Navy are comprehensive, due to problems with data analysis and presentation (see General Comments No. 2, 4, 5, 6). Once the additional data analysis and presentation has been performed and presented to the regulatory agencies, it may be possible to identify the data gaps for soil at each of the OU-2B sites and for OU-wide groundwater. Any subsequent site characterization activities proposed to address data gaps must be clearly outlined in subsequent documents including sampling locations, depths, methods, analytical suites, and rationale.

Response: According to U.S. Environmental Protection Agency (EPA) guidance "Conducting Remedial Investigations and Feasibility Studies Under CERCLA," dated 1988, the purpose of the RI is to characterize the nature and extent of risks posed by hazardous wastes. "The objective of the RI/FS process is not the unobtainable goal to remove *all* uncertainty, but rather to gather information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a site." The Navy believes that OU-2B soil and groundwater is adequately characterized in the RI for the purpose of recommending further evaluation of the sites in a feasibility study (FS), and OU-wide groundwater and soil for all the sites are recommended for further evaluation in a FS. Although the Navy acknowledges that some

data gaps are present at OU-2B, additional data analysis and presentation in the RI report will not change the recommendation for evaluation of the sites in an FS. Based on EPA's RI/FS guidance, additional sampling to address data gaps affecting the remedial action will be conducted and presented in a separate field sampling plan.

2. Comment:

In its review of the draft RI report, GSU noted persistent problems with data evaluation and presentation that made it difficult to review the report and agree that adequate site characterization had been performed. These problems were not corrected in the draft final RI document. Specifically, GSU requested that the spatial distribution of soil sample locations and depths for each chemical group relative to industrial physical site features (potential and known sources) be provided on the figures. Although maps showing sampling locations by analytical group were provided in the draft final RI report, this information alone is not sufficient to determine sampling adequacy. The maps must also include analytical results and the locations of known or potential sources. GSU cannot determine if adequate characterization has been performed at each site without site-specific maps of analytical data.

Recommendation

GSU requests that maps be provided that show the detected concentrations of chemicals in soil using insert boxes, spider diagrams, colored symbols, or other appropriate means. Figures containing analytical results for soil should indicate those sample locations for which detection limits exceed the screening levels and the magnitude of the exceedence (see General Comment No. 6).

Response:

The Navy believes that OU-2B soil and groundwater is adequately presented in the RI. Although each analytical result is not posted on the maps, analytical results that exceed PRGs are shown on the maps.

3. Comment:

In its response to comments on the draft RI report, the Navy stated that "in an attempt to limit the length of the nature and extent discussion so that it would still have a discernable focus on those chemicals that are identified as posing significant risk at each site, the Navy chose to focus on those chemicals that were identified as risk drivers." However, the RI/FS process requires that site characterization and the nature and extent evaluation be performed independent of the risk assessment. The results of all soil and groundwater contamination should be presented and discussed in an unbiased and systematic way. In addition, the nature and extent

discussion should include those chemicals that have the potential to migrate to and further degrade groundwater. Volatile organic compounds (VOCs) present in soil at concentrations that are much lower than residential soil preliminary remediation goals (PRGs) have the potential to act as continuing sources of groundwater contamination.

One way to limit the amount of information that is discussed and presented on maps, while still keeping an unbiased approach to the nature and extent evaluation, is to select a subset of chemicals based on relative concentrations and frequency of detection that represent the greatest impact to the site. Typically, a subset of those chemicals will turn out to be the risk drivers.

Recommendation

GSU recommends that the Navy use an approach to the nature and extent evaluation that is independent of the risk assessment results. For each chemical group, consider focusing the discussion and presentation on those chemicals that show the greatest extent, concentrations, and frequency of detection in an effort to limit the volume of information presented while still providing a clear picture of the contamination issues at each site.

Response: The Navy disagrees with DTSC's assertion that the RI/FS process requires that characterization and nature and extent evaluations be conducted independent of the risk assessments. EPA's RI/FS guidance states that the purpose of the RI is to characterize the nature and extent of risks posed by hazardous wastes. Specifically, it states, "Analyses of the data collected should focus on the development or refinement of the conceptual site model by presenting and analyzing data on source characteristics, the nature and extent of contamination, the contaminated transport pathways and fate, and the effects on human health."

The RI report systematically presents soil and groundwater data in a manner that is fully consistent with RI/FS guidance. The types and concentrations of all detected chemicals are presented. In addition, an initial screening of chemical concentrations against PRGs is conducted, as requested by the agencies in comments received on the draft RI report, followed by an evaluation of sources and the types of chemicals used by the Navy and an evaluation of the spatial distribution of chemicals posing risk.

4. Comment: In its review of the draft RI report, GSU noted that planar

groundwater maps of contaminant concentration data from multiple depth intervals were prepared which are not appropriate for the hydrogeologic conditions at OU-2B. Groundwater data should be presented by depth-discrete intervals based on hydrostratigraphy. GSU requested that depth-discrete isoconcentration contour maps be prepared for the shallow, medium, and deep Merritt Sand units, at a minimum. GSU disagrees with the Navy's assertion in its response to comments that "addition of multiple depth plan views for each contaminant would not provide any further understanding of the plumes." It is the opinion of the GSU that contouring multiple depth intervals on the same map is confusing and does not lead to a meaningful interpretation of the distribution of VOCs in groundwater or migration pathways.

GSU cannot concur with the interpretation of the nature and extent of contamination of OU-wide groundwater (including the vertical extent) without further evaluation of the data as described. The location of known or potential sources should be used in combination with lithologic and chemical data to evaluate the extent of contamination and to explain the distribution pattern that is found. Since it has been determined that dense non-aqueous phase liquids (DNAPLs) are likely to be present between 10 and 55 feet below ground surface at OU-2B, the specific location of sources combined with lithologic and chemical data should be used to evaluate where DNAPLs may reside within the aquifer.

In addition, GSU disagrees with the interpretations of the extent of VOCs in groundwater presented on the cross-sections in the draft final RI report because data with elevated detection limits (two to three orders of magnitude greater than screening levels) have been used to contour groundwater data as "not-detected" (ND). GSU disagrees with the method of interpretation that relies on samples with elevated detection limits for determining the extent of contamination and requests that the Navy consider qualifying these data or eliminating them from the nature and extent interpretations, as appropriate (see General Comment No. 6).

Recommendation

Please prepare depth-discrete maps of groundwater data showing the lateral extent of contamination in each hydrostratigraphic unit. Include a description of how hydrostratigraphic units were identified, and evaluation of site-specific groundwater flow directions and gradients within each unit, and an evaluation of site-specific vertical

gradients between each unit. Isoconcentration contour maps for each unit must include the analytical data upon which the extent is based, and indicate those sample locations for which elevated detection limits are present.

Finally, GSU requests that lithology and the locations of surface sources be added to the cross-section in Section 9 to assist with the interpretation of hydrostratigraphy and to demonstrate how lithology affects contaminant migration. These cross-sections should be constructed to demonstrate areas where DNAPLs may be present, the location of DNAPL concentrations relative to known or potential sources, and the lithology in the vicinity of these sources.

Response: As stated in Navy's response to DTSC's comments on the draft report, planar maps were not constructed at multiple horizons because detections from all levels were compiled into a single plan view to depict the maximum horizontal extent of the plume. In addition, the location of the cross sections were chosen to demonstrate the maximum vertical extent of the plume through the most contaminated areas. Addition of multiple depth plan views for each contaminant would not provide any further understanding of the plumes for the purpose of the RI. The Navy believes that OU-2B groundwater is adequately characterized in the RI. Additional delineation of chemicals of concern in groundwater will be conducted as a part of the remedial design.

5. Comment: GSU is particularly concerned with the nature and extent evaluation of OU-wide groundwater and the apparent inadequacy of the monitoring network well network. While a tremendous amount of groundwater data has been collected from OU-2B, there appears to be an insufficient number of monitoring wells from which repeatable data can be obtained. Much of the groundwater data available for OU-2B is from one-time direct-push grab samples. While grab samples are a useful screening tool, these data are not repeatable and cannot be used to evaluate plume migration and seasonal fluctuations.

Figures 9-4 and 9-8 in the draft final RI report, which are intended to show OU-wide groundwater sampling locations for the various chemical suites, do not distinguish between direct-push locations and actual monitoring well locations, nor do these maps indicate at what depths samples were collected from OU-2B, and the large areal extent and depth of the plumes, GSU does not find these generalized figures to be useful.

For each depth-discrete hydrostratigraphic interval (for example, the upper, middle, and deep Merritt Sand units), monitoring wells are needed in the center of the plum(s) to monitor maximum concentrations, as well as on the plume margins to monitor lateral extent and plume migration. Monitoring wells should be located upgradient as well as downgradient of known sources. It is not readily discernable from the maps provided in Section 9 of the draft final RI report how many wells are available for each depth interval sampled. A sufficient number of monitoring wells must be placed in each depth-discrete interval to evaluate groundwater flow directions, gradients and velocities, in addition to plume migration and seasonal fluctuations.

Recommendation

In addition to providing depth-discrete maps of analytical data as suggesting in General Comment No. 4, GSU requests that symbols used on maps distinguish between monitoring wells and direct-push samples. Symbols for monitoring wells screened at different depths should vary based on the hydrogeologic interval sampled. Also, GSU requests that a table of monitoring well construction details for all Ou-2B monitoring wells be provided. Once these activities are complete, GSU recommends that an evaluation of the monitoring well network at OU-2B be performed to determine where additional monitoring wells are need.

Response:

The Navy agrees that monitoring well data have been limited; however, much of the direct push groundwater data were collected in 2001 during data gap sampling, which was planned in collaboration with the agencies and intended to adequately delineate contaminant plumes in groundwater for the purposes of the RI. In addition, the Navy began a basewide groundwater monitoring program in 2002 in response to the agencies' requests to evaluate the monitoring well network; the program includes: (1) monitoring the status of contaminant plumes in groundwater, (2) evaluating the potential for natural degradation, (3) identifying the groundwater flow direction and gradients, (4) assessing the need for additional wells to better delineate plumes, and (5) determining whether some wells could be abandoned. The Navy believes that sufficient data have been collected for OU-2B groundwater and the figures provided in the RI report are adequate to characterize groundwater for the RI. It should also be noted that groundwater plume figures in the RI report already distinguish between monitoring wells and direct push samples (see Figures 9-14, 9-19, 9-20 through 9-22, 9-24, 9-27 through 9-44).

Monitoring well screen depths are provided on many of the figures and in Appendix A, and construction details are provided in the appropriate field investigation reports, which are referenced in the RI report.

6. Comment:

In its review of the draft RI report, GSU noted persistent problems with analytical detection limits elevated above screening levels. These problems were not adequately addressed in the draft final RI report. While GSU understands that elevated detection limits may sometimes be unavoidable due to the variety of reasons described by the Navy, it is the opinion of GSU that data with detection limits that are elevated two to three orders of magnitude above screening levels should not be used to interpret the nature and extent of contamination. As the data are currently presented, it is not possible to ascertain the severity of the problem and whether or not the sites have been adequately characterized (see General Comments No. 2 and 4).

The Navy has stated that detection limits that exceed the PRG would be a concern only for the risk assessment. However, it is the opinion of GSU that elevated detection limits will also potentially mask areas of soil contamination that may act as a continuing source to groundwater. In addition, data with detection limits that are greater than screening levels should not be used to contour groundwater data as ND (see General Comment No. 4).

Recommendation

Please consider eliminating data with elevated detection limits from the nature and extent interpretations, as appropriate, or at least qualify their use. Figures containing analytical results for soil and groundwater should indicate those sample locations for which detection limits exceed the screening levels. For simplicity, one suggested format can be to depict the magnitude of the exceedence (such as less than 2 times, 2 to 10 times, or greater than 10 times the screening level) with colored symbols. Another method that could be used is to provide insert boxes or spider diagrams with the actual value of the exceedence depicted with a "U" qualifier along with detected values for specific chemicals.

Response:

The Navy acknowledges that the extent of groundwater contamination may not be fully delineated and has identified data gaps; however, additional data analysis and presentation in the RI report will not change the recommendation for evaluation of soil and groundwater at the sites in an FS.

Regarding the data used in the RI, several issues should be noted. First, detection limits that are above the screening levels are unlikely to mask a continuing source to groundwater, because the Navy used conservative screening levels that correspond to the lower end of the risk range (10^{-6}). Second, the data were validated and are of sufficient quality for use in a human health risk assessment. Qualification of these data and typical validation procedures do not compare the detection limits to the screening levels. Thus, there is no rationale for excluding data from evaluating nature and extent. The Navy recognizes that the precise boundary of the plume may be uncertain, but the extent of that uncertainty of the plume boundary does not warrant further qualification or exclusion of any data, or reevaluation of the RI conclusions. The Navy does not share GSU's concern that elevated detection limits will mask areas of soil contamination. The Navy anticipates remedial action for groundwater and aquifer materials should address those contaminants that have likely been released to the site.

The Navy believes that OU-2B soil and groundwater is adequately characterized in the RI for the purpose of recommending further evaluation of the sites in a FS. In addition, the information is sufficient for the intended use and no modifications are needed.

- 7. Comment:** **Due to incomplete characterization and/or problems associated with elevated detection limits, it is very likely that the risks for Sites 3, 4, 11, and 21 have been underestimated.**

Response: The risk assessment is by design a conservative estimate because of the assumptions and parameters used in calculations, and statistical methods used for calculating the exposure point concentration for nondetected data with elevated detection limits are unlikely to underestimate risk because a value between 0 and the detection limit was randomly assigned. In addition, the Navy believes that sufficient sampling has been conducted to evaluate the likely sources of contamination at each site. Data gaps that have been identified do not reflect widespread contamination.

- 8. Comment:** **The RI report is extremely bulky (four volumes in 3- and 4-inch binders), and this makes it awkward to review and read. GSU requests that the Navy consider supplying raw data on compact disks whenever possible to minimize the bulk of these reports.**

Response: The Navy agrees and will provide data on compact disks in the future.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Wang/Tucker

June 20, 2005

Thomas Macchiarella
BRAC Operations, Code 06CA.TM
Department of the Navy, Southwest Division
Naval Facilities Engineering Command
1230 Columbia Street, Suite 1100
San Diego, CA 92101

**RE: Draft Final Remedial Investigation Report, Operable Unit 2B, Sites 3, 4, 11 and 21
Alameda Point**

Dear Mr. Macchiarella:

EPA has reviewed the above referenced document, prepared by Tetra Tech EM Inc and submitted by the Navy on May 16, 2005. A major improvement in the draft final document is the revised risk assessment which, in response to EPA's request, carries all useable data through the risk calculations without screening out any contaminants. However, there are still some areas where the Remedial Investigation falls short and these problems will need to be addressed prior to issuance of the draft final Feasibility Study and the Record of Decision. Some additional information will also be gathered during the Remedial Design and Remedial Action phase of the clean up for this operable unit that will further refine issues related to groundwater contamination.

Although the risk assessment is more thorough in the draft final document, it is still limited by the lack of soil data taken beneath most existing buildings and by the high detection limits that characterize much of the older data. In addition, sampling beneath and around many solid waste management units (SWMUs) has not been performed and this data is necessary to form the basis for addressing the SWMUs as part of the ROD. EPA therefore believes that soil risk at the site is still likely underestimated and that the nature and extent of soil contamination is also incomplete.

To rectify these problems, EPA requests that the Navy collect soil data beneath all SWMUs and incorporate the results of the sampling into either the draft or the draft final Feasibility Study. To address the potential problem of contaminated soil beneath existing buildings, EPA requests carrying the question of the soil under the buildings into the FS and evaluating a remedy for the soil beneath the buildings such as Institutional Controls that prohibits removal of the buildings and thus prevents exposure to the soil beneath the buildings.

In terms of the human health risk assessment for groundwater, EPA believes that there is sufficient information in the RI to develop reasonable alternatives in the FS to clean up the groundwater for the purpose of protecting human health, although we recognize that the complete

nature and extent of the groundwater contamination will have to be determined at the RD/RA stage. However, the ecological risk assessment which determines the impact of groundwater contamination on aquatic receptors in the Seaplane Lagoon is inadequate. To solve this problem, the Navy has agreed to install five additional monitoring wells within 50 feet of the eastern boundary of the Seaplane Lagoon, within Operable Unit 2B and inland of the existing scawall. The wells will become part of the Basewide Groundwater Monitoring Program and will be installed and sampled as soon as funds are available. The monitoring data will enable the Navy and regulators to determine whether there is any immediate or potential impact to aquatic receptors in the Seaplane Lagoon.

In order to maintain our progress at these sites, and based on the expectation that the Navy will address our concerns as outlined in this letter, EPA agrees to finalization of this Remedial Investigation Report for OU 2B.

We look forward to working with you on the Feasibility Study Report. If you have any questions, please contact me at (415) 972-3029.

Sincerely,

Anna-Marie Cook
Remedial Project Manager
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Final

**OU-2B Remedial Investigation Report
Sites 3, 4, 11, and 21
Volume IV of IV
Appendices F and G**

**Alameda Point
Alameda, California**

August 5, 2005

Prepared for:
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APPENDIX F
DRAFT FINAL HUMAN HEALTH RISK ASSESSMENT
SITES 3, 4, 11, AND 21
Alameda Point, Alameda, California

May 16, 2005

Prepared for



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CONTENTS

1.0	INTRODUCTION	1
2.0	OBJECTIVES AND SCOPE.....	1
3.0	BACKGROUND	2
3.1	Regulatory History.....	3
3.2	Operable Unit 2B Site Descriptions.....	3
3.3	Future Land Use For Sites Within Operable Unit 2B.....	4
4.0	DATA SELECTION AND METHODS FOR IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN	5
4.1	DATA SELECTION RULES	5
4.1.1	Selection of Data: Quality.....	6
4.1.2	Selection of Data: Data Quality Objectives.....	6
4.1.3	Selection of Data: Duplicate Data.....	6
4.1.4	Selection of Data: Temporal Scales.....	6
4.2	MEDIUM-SPECIFIC DATA SELECTION: OPERABLE UNIT 2B SOIL.....	7
4.3	SITE-SPECIFIC GROUNDWATER DATA SELECTION	7
4.4	CHEMICALS OF POTENTIAL CONCERN DETERMINATION	8
5.0	EXPOSURE ASSESSMENT	8
5.1	Exposure Setting and Potential Receptors	9
5.1.1	Groundwater Use	9
5.1.2	Current Land Use.....	10
5.1.3	Future Land Use.....	10
5.2	Exposure Pathways and Exposure Routes	10
5.2.1	Current and Future Commercial/Industrial Worker Exposure.....	11
5.2.2	Hypothetical Future Resident (Adult/Child) Exposure.....	12
5.2.3	Hypothetical Future Construction Worker Exposure	13
5.3	Exposure Point Concentrations.....	13
5.3.1	Distribution Testing	14
5.3.2	Summary Statistics (Population Moments) and Proxy Values	15
5.3.3	Nonparametric Statistics (Bootstrapping Techniques)	15
5.3.4	Exposure Point Concentration Summary.....	16
5.4	Quantification of Chemical Intake for Pathway Specific Exposures for Each Potential Receptor.....	16
5.4.1	Standard Exposure Assumptions Used	17
5.4.2	Pathway-Specific Intake Considerations	17

CONTENTS (CONTINUED)

6.0	TOXICITY ASSESSMENT	20
6.1	Reference Doses.....	20
6.2	Slope Factors.....	22
6.3	Route-to-Route Extrapolation.....	23
6.4	Surrogates	24
6.5	Lead.....	25
6.6	Toxicity Profiles.....	25
6.7	Total Petroleum Hydrocarbons	25
7.0	RISK CHARACTERIZATION	25
7.1	Characterization of Noncancer Hazards	26
7.2	Characterization of Cancer Risks.....	26
7.3	Characterizing Health Effects Associated with Exposure to Lead	27
7.4	Site-Specific Risk Characterization: Risk Assessment Results	27
	7.4.1 Surface and Subsurface Soil	28
	7.4.2 Groundwater Plume 1	38
	7.4.3 Lead in Soil and Groundwater	40
8.0	UNCERTAINTY DISCUSSION.....	42
8.1	Uncertainty in Data Reduction and Chemicals of Potential Concern Selection Process	43
8.2	Uncertainty in Exposure Assessment.....	43
	8.2.1 Exposure Scenarios.....	43
	8.2.2 Selecting Exposure Pathways	44
	8.2.3 Estimating Exposure Point Concentrations	44
	8.2.4 Use of Exposure Models.....	44
	8.2.5 Selecting Exposure Variables	45
8.3	Uncertainty in Toxicity Assessment.....	46
	8.3.1 Chromium Speciation	47
	8.3.2 Surrogates for Total Petroleum Hydrocarbons	47
	8.3.3 Arsenic Toxicity.....	48
	8.3.4 Use of Federal Toxicity Criteria Instead of California Values	48
	8.3.5 Route-to-Route Extrapolation.....	54
	8.3.6 Chemicals Lacking Toxicity Criteria.....	54
	8.3.7 Manganese Toxicity Criteria.....	54
	8.3.8 Trichloroethene Toxicity	55
	8.3.9 Use of <i>cis</i> -1,2-Dichloroethene as Surrogate for Toxicity of Total 1,2- Dichloroethene Mixture	56

CONTENTS (CONTINUED)

8.4	Uncertainties in Risk Characterization	56
8.4.1	Additivity Assumption in Risk Characterization	56
8.4.2	Presentation of Point Estimates in Risk Characterization.....	57
8.5	Uncertainty Summary	57
9.0	REFERENCES	58

ATTACHMENTS

F1	Vapor Pathway Screening and Johnson and Ettinger Model Output
F2	Central Tendency Estimates
F3	Physical Chemical Data Used in the Risk Assessment
F4	Toxicity Profiles
F5	LeadSpread Modeling Results

FIGURES

F.3-1	Alameda Point Location Map
F.3-2	Operable Units, CERCLA Sites, and Disposal Parcels
F.3-3	Planned Reuse Areas
F.4-1	Site 3 Soil Sampling Locations
F.4-2	Site 4 Soil Sampling Locations
F.4-3	Site 11 Soil Sampling Locations
F.4-4	Site 21 Soil Sampling Locations
F.4-5	OU-2B Groundwater Domestic Use Sampling Locations
F.5-1	Conceptual Site Model

TABLES

Selection of Exposure Pathways

F-1.1 EPA RAGS Part D Table 1, Selection of Exposure Pathways

Occurrence, Distribution, and Selection of COPCs

F-2.1 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Site 3 Surface Soil

F-2.2 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Site 3 Subsurface Soil

F-2.3 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Site 4 Surface Soil

F-2.4 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Site 4 Subsurface Soil

F-2.5 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Site 11 Surface Soil

F-2.6 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Site 11 Subsurface Soil

F-2.7 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Site 21 Surface Soil

F-2.8 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Site 21 Subsurface Soil

F-2.9 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Groundwater – Plume 1

F-2.10 EPA RAGS Part D Table 2, Occurrence, Distribution, and Selection of Chemicals of Potential Concern, Groundwater – Plume 2

Exposure Point Concentration Summaries

F-3.1 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Site 3 Surface Soil

F-3.2 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Site 3 Subsurface Soil

F-3.3 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Site 4 Surface Soil

F-3.4 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Site 4 Subsurface Soil

F-3.5 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Site 11 Surface Soil

- F-3.6 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Site 11 Subsurface Soil
- F-3.7 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Site 21 Surface Soil
- F-3.8 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Site 21 Subsurface Soil
- F-3.9 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, Groundwater – Plume 1
- F-3.10 EPA RAGS Part D Table 3, Exposure Point Concentration Summary, VOCs in Groundwater – **PLUME 2**

Values Used for Daily Intake

- F-4.1 EPA RAGS Part D Table 4, Values Used for Daily Intake, RME Soil Exposures
- F-4.2 EPA RAGS Part D Table 4, Values Used for Daily Intake, RME Groundwater Exposures
- F-4.3 EPA RAGS Part D Table 4, Values Used for Daily Intake, CTE Soil Exposures
- F-4.4 EPA RAGS Part D Table 4, Values Used for Daily Intake, CTE Groundwater Exposures

Noncancer Toxicity Data

- F-5.1.EPA EPA RAGS Part D Table 5, EPA Non-cancer Toxicity Data, Oral/Dermal
- F-5.2.EPA EPA RAGS Part D Table 5, EPA Non-cancer Toxicity Data, Inhalation

Cancer Toxicity Data

- F-6.1.EPA EPA RAGS Part D Table 6, EPA Cancer Toxicity Data, Oral/Dermal
- F-6.2.EPA EPA RAGS Part D Table 6, EPA Cancer Toxicity Data, Inhalation

Site 3 Chemical Noncancer Hazards

- F-7.1.1.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 3, Current Industrial Worker
- F-7.1.2.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 3, Future Construction Worker
- F-7.1.3.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 3, Future Adult Resident
- F-7.1.4.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 3, Hypothetical Future Child Resident

- F-7.1.5.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 3, Future Redeveloped Industrial Worker
- F-7.1.6.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 3, Future Redeveloped Construction Worker
- F-7.1.7.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 3, Future Redeveloped Adult Resident
- F-7.1.8.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 3, Future Redeveloped Child Resident

Site 3 Chemical Cancer Risks

- F-8.1.1.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 3, Current Industrial Worker
- F-8.1.2.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 3, Future Construction Worker
- F-8.1.3.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 3, Future Adult Resident
- F-8.1.4.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 3, Future Child Resident
- F-8.1.5.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 3, Future Redeveloped Industrial Worker
- F-8.1.6.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 3, Future Redeveloped Construction Worker
- F-8.1.7.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 3, Future Redeveloped Adult Resident
- F-8.1.8.RME EPA RAGS Part D Table ^{7b}~~7a~~, Calculation of RME Chemical Cancer Risks, Site 3, Future Redeveloped Child Resident

Site 3 Summaries of Receptor Risks and Hazards for COPCs

- F-9.1.1.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 3, Current Industrial Worker
- F-9.1.2.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 3, Future Construction Worker

- F-9.1.3.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 3, Future Adult Resident
- F-9.1.4.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 3, Future Child Resident
- F-9.1.5.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 3, Future Redeveloped Industrial Worker
- F-9.1.6.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 3, Future Redeveloped Construction Worker
- F-9.1.7.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 3, Future Redeveloped Adult Resident
- F-9.1.8.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 3, Future Redeveloped Child Resident

Site 3 Risk Summaries

- F-10.1.1.RME EPA RAGS Part D Table 10, Risk Summary, Site 3, Current Industrial Worker
- F-10.1.2.RME EPA RAGS Part D Table 10, Risk Summary, Site 3, Future Construction Worker
- F-10.1.3.RME EPA RAGS Part D Table 10, Risk Summary, Site 3, Future Adult Resident
- F-10.1.4.RME EPA RAGS Part D Table 10, Risk Summary, Site 3, Future Child Resident
- F-10.1.5.RME EPA RAGS Part D Table 10, Risk Summary, Site 3, Future Redeveloped Industrial Worker
- F-10.1.6.RME EPA RAGS Part D Table 10, Risk Summary, Site 3, Future Redeveloped Construction Worker
- F-10.1.7.RME EPA RAGS Part D Table 10, Risk Summary, Site 3, Future Redeveloped Adult Resident
- F-10.1.8.RME EPA RAGS Part D Table 10, Risk Summary, Site 3, Future Redeveloped Child Resident

Site 4 Chemical Noncancer Hazards

- F-7.2.1.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 4, Current Industrial Worker

- F-7.2.2.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 4, Future Construction Worker
- F-7.2.3.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 4, Future Adult Resident
- F-7.2.4.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 4, Future Child Resident
- F-7.2.5.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 4, Future Redeveloped Industrial Worker
- F-7.2.6.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 4, Future Redeveloped Construction Worker
- F-7.2.7.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 4, Future Redeveloped Adult Resident
- F-7.2.8.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 4, Future Redeveloped Child Resident

Site 4 Chemical Cancer Risks

- F-8.2.1.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 4, Current Industrial Worker
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- F-8.2.3.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 4, Future Adult Resident
- F-8.2.4.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 4, Future Child Resident
- F-8.2.5.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 4, Future Redeveloped Industrial Worker
- F-8.2.6.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 4, Future Redeveloped Construction Worker
- F-8.2.7.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 4, Future Redeveloped Adult Resident
- F-8.2.8.RME EPA RAGS Part D Table ^{7b}~~7a~~, Calculation of RME Chemical Cancer Risks, Site 4, Future Redeveloped Child Resident

Site 4 Summaries of Receptor Risks and Hazards for COPCs

F-9.2.1.RME	EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 4, Current Industrial Worker
F-9.2.2.RME	EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 4, Future Construction Worker
F-9.2.3.RME	EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 4, Future Adult Resident
F-9.2.4.RME	EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 4, Future Child Resident
F-9.2.5.RME	EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 4, Future Redeveloped Industrial Worker
F-9.2.6.RME	EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 4, Future Redeveloped Construction Worker
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F-9.2.8.RME	EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 4, Future Redeveloped Child Resident

Site 4 Risk Summaries

F-10.2.1.RME	EPA RAGS Part D Table 10, Risk Summary, Site 4, Current Industrial Worker
F-10.2.2.RME	EPA RAGS Part D Table 10, Risk Summary, Site 4, Future Construction Worker
F-10.2.3.RME	EPA RAGS Part D Table 10, Risk Summary, Site 4, Future Adult Resident
F-10.2.4.RME	EPA RAGS Part D Table 10, Risk Summary, Site 4, Future Child Resident
F-10.2.5.RME	EPA RAGS Part D Table 10, Risk Summary, Site 4, Future Redeveloped Industrial Worker
F-10.2.6.RME	EPA RAGS Part D Table 10, Risk Summary, Site 4, Future Redeveloped Construction Worker
F-10.2.7.RME	EPA RAGS Part D Table 10, Risk Summary, Site 4, Future Redeveloped Adult Resident

F-10.2.8.RME EPA RAGS Part D Table 10, Risk Summary, Site 4, Future Redeveloped Child Resident

Site 11 Chemical Noncancer Hazards

F-7.3.1.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 11, Current Industrial Worker

F-7.3.2.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 11, Future Construction Worker

F-7.3.3.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 11, Future Adult Resident

F-7.3.4.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 11, Future Child Resident

F-7.3.5.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 11, Future Redeveloped Industrial Worker

F-7.3.6.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 11, Future Redeveloped Construction Worker

F-7.3.7.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 11, Future Redeveloped Adult Resident

F-7.3.8.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 11, Future Redeveloped Child Resident

Site 11 Chemical Cancer Risks

F-8.3.1.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 11, Current Industrial Worker

F-8.3.2.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 11, Future Construction Worker

F-8.3.3.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 11, Future Adult Resident

F-8.3.4.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 11, Future Child Resident

F-8.3.5.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 11, Future Redeveloped Industrial Worker

- F-8.3.6.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 11, Future Redeveloped Construction Worker
- F-8.3.7.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 11, Future Redeveloped Adult Resident
- F-8.3.8.RME EPA RAGS Part D Table ^{7b}~~7a~~, Calculation of RME Chemical Cancer Risks, Site 11, Future Redeveloped Child Resident

Site 11 Summaries of Receptor Risks and Hazards for COPCs

- F-9.3.1.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 11, Current Industrial Worker
- F-9.3.2.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 11, Future Construction Worker
- F-9.3.3.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 11, Future Adult Resident
- F-9.3.4.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 11, Future Child Resident
- F-9.3.5.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 11, Future Redeveloped Industrial Worker
- F-9.3.6.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 11, Future Redeveloped Construction Worker
- F-9.3.7.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 11, Future Redeveloped Adult Resident
- F-9.3.8.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 11, Future Redeveloped Child Resident

Site 11 Risk Summaries

- F-10.3.1.RME EPA RAGS Part D Table 10, Risk Summary, Site 11, Current Industrial Worker
- F-10.3.2.RME EPA RAGS Part D Table 10, Risk Summary, Site 11, Future Construction Worker
- F-10.3.3.RME EPA RAGS Part D Table 10, Risk Summary, Site 11, Future Adult Resident
- F-10.3.4.RME EPA RAGS Part D Table 10, Risk Summary, Site 11, Future Child Resident

- F-10.3.5.RME EPA RAGS Part D Table 10, Risk Summary, Site 11, Future Redeveloped Industrial Worker
- F-10.3.6.RME EPA RAGS Part D Table 10, Risk Summary, Site 11, Future Redeveloped Construction Worker
- F-10.3.7.RME EPA RAGS Part D Table 10, Risk Summary, Site 11, Future Redeveloped Adult Resident
- F-10.3.8.RME EPA RAGS Part D Table 10, Risk Summary, Site 11, Future Redeveloped Child Resident

Site 21 Chemical Noncancer Hazards

- F-7.4.1.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 21, Current Industrial Worker
- F-7.4.2.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 21, Future Construction Worker
- F-7.4.3.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 21, Future Adult Resident
- F-7.4.4.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 21, Future Child Resident
- F-7.4.5.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 21, Future Redeveloped Industrial Worker
- F-7.4.6.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 21, Future Redeveloped Construction Worker
- F-7.4.7.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 21, Future Redeveloped Adult Resident
- F-7.4.8.RME EPA RAGS Part D Table 7b, Calculation of RME Chemical Noncancer Hazards, Site 21, Future Redeveloped Child Resident

Site 21 Chemical Cancer Risks

- F-8.4.1.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 21, Current Industrial Worker
- F-8.4.2.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 21, Future Construction Worker

- F-8.4.3.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 21, Future Adult Resident
- F-8.4.4.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 21, Future Child Resident
- F-8.4.5.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 21, Future Redeveloped Industrial Worker
- F-8.4.6.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 21, Future Redeveloped Construction Worker
- F-8.4.7.RME EPA RAGS Part D Table 7a, Calculation of RME Chemical Cancer Risks, Site 21, Future Redeveloped Adult Resident
- F-8.4.8.RME EPA RAGS Part D Table ^{7b}~~7a~~, Calculation of RME Chemical Cancer Risks, Site 21, Future Redeveloped Child Resident

Site 21 Summaries of Receptor Risks and Hazards for COPCs

- F-9.4.1.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 21, Current Industrial Worker
- F-9.4.2.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 21, Future Construction Worker
- F-9.4.3.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 21, Future Adult Resident
- F-9.4.4.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 21, Future Child Resident
- F-9.4.5.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 21, Future Redeveloped Industrial Worker
- F-9.4.6.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 21, Future Redeveloped Construction Worker
- F-9.4.7.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 21, Future Redeveloped Adult Resident
- F-9.4.8.RME EPA RAGS Part D Table 9, Summary of Receptor Risks and Hazards for COPCs, Site 21, Future Redeveloped Child Resident

Site 21 Risk Summaries

- F-10.4.1.RME EPA RAGS Part D Table 10, Risk Summary, Site 21, Current Industrial Worker
- F-10.4.2.RME EPA RAGS Part D Table 10, Risk Summary, Site 21, Future Construction Worker
- F-10.4.3.RME EPA RAGS Part D Table 10, Risk Summary, Site 21, Future Adult Resident
- F-10.4.4.RME EPA RAGS Part D Table 10, Risk Summary, Site 21, Future Child Resident
- F-10.4.5.RME EPA RAGS Part D Table 10, Risk Summary, Site 21, Future Redeveloped Industrial Worker
- F-10.4.6.RME EPA RAGS Part D Table 10, Risk Summary, Site 21, Future Redeveloped Construction Worker
- F-10.4.7.RME EPA RAGS Part D Table 10, Risk Summary, Site 21, Future Redeveloped Adult Resident
- F-10.4.8.RME EPA RAGS Part D Table 10, Risk Summary, Site 21, Future Redeveloped Child Resident

ACRONYMS AND ABBREVIATIONS

Army	U.S. Department of the Army
ARRA	Alameda Reuse and Redevelopment Authority
AST	Aboveground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
BCT	Base Realignment and Closure Cleanup Team
bgs	Below ground surface
BKF	Benzo(k)fluoranthene
BRAC	Base Realignment and Closure
BSU	Bay Sediment Unit
BTEX	Benzene, toluene, ethylbenzene, and xylenes
BW	Body weight
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract laboratory program
COPC	Constituent of potential concern
CRWQCB	California Regional Water Quality Control Board
CSM	Conceptual site model
CTE	Central tendency exposure
DCA	Dichloroethane
DCE	Dichloroethene
DQO	Data quality objective
DTSC	California Environmental Protection Agency Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
FOD	Frequency of detection
ft ²	Square foot
FS	Feasibility study
FWBZ	First water-bearing zone
HEAST	Health Effects Assessment Summary Tables
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient

ACRONYMS AND ABBREVIATIONS (Continued)

IR	Inhalation rate
IRIS	Integrated Risk Information System
kg	Kilogram
LOAEL	Lowest adverse effect level
MCL	Maximum contaminant level
$\mu\text{g}/\text{m}^3$	Micrograms per cubic meter
$\mu\text{g}/\text{dL}$	Microgram per deciliter
$\mu\text{g}/\text{L}$	Microgram per liter
$\mu\text{mhos}/\text{cm}$	Micromhos per centimeter
mg/kg	Milligram per kilogram
$\text{mg}/\text{kg}\cdot\text{day}$	Milligrams per kilogram per day
mg/L	Milligram per liter
MTBE	Methyl tertiary-butyl ether
NACIP	Navy Assessment and Control of Installation Pollutant
NAPL	Nonaqueous-phase liquid
NARF	Naval Area Rework Facility
NAS	Naval Air Station
Navy	U.S. Department of the Navy
NCEA	National Center for Environmental Assessment
NOAEL	No adverse effect level
NTP	National Toxicology Program
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable unit
PAH	Polynuclear aromatic hydrocarbons
PBPK	Physiologically based pharmacokinetic
PCB	Polychlorinated biphenyl
PEF	Particulate emission factor
PRG	Preliminary remediation goal
R&D	Research and development
RAGS	Risk Assessment Guidance for Superfund
REL	Reference exposure level
RfC	Reference concentration
RfD	Reference dose

ACRONYMS AND ABBREVIATIONS (Continued)

RI	Remedial investigation
RME	Reasonable maximum exposure
SF	Cancer slope factor
SQL	Sample quantitation limit
SVOC	Semivolatile organic compound
SWBZ	Second water-bearing zone
SWRCB	California State Water Resources Control Board
TCE	Trichloroethene
TDS	Total dissolved solids
Tetra Tech	Tetra Tech EM Inc.
TPH	Total petroleum hydrocarbons
UCF	Unit conversion factor
UCL ₉₅	95th percentile upper confidence limit on the arithmetic mean
URF	Unit risk factor
UST	Underground storage tank
VOC	Volatile organic compound

1.0 INTRODUCTION

The U.S. Department of the Navy (Navy) is conducting a remedial investigation (RI) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (U.S. Environmental Protection Agency [EPA] 1988). The CERCLA Sites 3, 4, 11, and 21 comprise Operable Unit 2B (OU-2B) at Alameda Point (formerly Naval Air Station [NAS] Alameda), located in Alameda, California. This report presents the human health risk assessment (HHRA) methodology and summary of results for OU-2B.

The organization of the HHRA and methodology used to evaluate human health risks are in accordance with the "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)" (EPA 1989) as well as subsequent Risk Assessment Guidance for Superfund (RAGS) Part D (EPA 2001b) for standard table presentation and format.

This report is organized as follows. The objectives and scope of the HHRA are described in Section 2. Background information is presented in Section 3. The methodology for grouping data and identifying chemicals of concern is provided in Section 4. The exposure assessment is described in Section 5. Section 6 presents the toxicity assessment for all chemicals of concern. The risk characterization methodologies and site-specific risk assessment results are presented in Section 7. The uncertainty analysis is contained in Section 8. References are provided in Section 9. Figures, tables, and attachments follow the main text of this appendix.

2.0 OBJECTIVES AND SCOPE

Site-specific HHRA's conducted for Alameda Point estimate potential human health risks associated with possible exposure to site-related chemicals. This baseline HHRA was conducted without regard to future remediation activities; however, reductions in chemical concentrations associated with past removal activities were considered in this evaluation.

HHRA's are prepared to evaluate potential health risks under current and future land use conditions. The specific objectives of this HHRA are as follows:

- Estimate the magnitude of potential human health risks associated with current and hypothetical future land use conditions
- Identify the environmental media and contaminants that pose the primary health concerns
- Identify the environmental media and contaminants that pose little or no threat to human health
- Provide the basis to support risk management decisions about the need for further action in the feasibility study (FS)

The HHRA was conducted in accordance with methods detailed in EPA guidance (EPA 1989) and "Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities" (California Environmental Protection Agency [Cal/EPA] Department of Toxic Substances Control [DTSC] 1992). In an effort to expedite the RI/FS process and streamline the review and comment process of the HHRA, the California Regional Water Quality Control Board (CRWQCB), DTSC, and EPA Region IX regional policy positions were incorporated. The EPA and DTSC framework consists of the following four basic steps:

- **Data Evaluation and Selection of Chemicals of Potential Concern (COPC).** This step consists of evaluating the analytical data for usability in the HHRA, grouping analytical data by site and by medium, and selecting COPCs in site media.
- **Exposure Assessment.** This step involves evaluating potential exposure pathways to the COPCs and human populations that might be exposed to them under current or future site conditions. Exposure point concentrations (EPC) are estimated from measured or modeled concentrations, and pathway-specific intakes (doses) are estimated using hypothetical receptors for evaluation in the subsequent risk calculations.
- **Toxicity Assessment.** This step consists of compiling toxicity values that characterize potential adverse health effects of exposure to COPCs.
- **Risk Characterization.** This step combines the results of the previous steps to quantitatively characterize potential human health risks associated with exposure to COPCs at the area under evaluation. Both potential cancer risks and hazard indices (HI), a measure of the potential for adverse health effects other than cancer, are evaluated.

3.0 BACKGROUND

Originally a peninsula, Alameda Island was detached from the mainland in 1876, when a channel was cut to link San Leandro Bay with the San Francisco Bay. The northern portion of Alameda Island was formerly tidal areas, marshlands, and sloughs adjacent to the historical San Antonio Channel, now known as the Oakland Inner Harbor. The U.S. Department of the Army (Army) acquired the installation property from the City of Alameda in 1930 and began construction activities in 1931. In 1936, the Navy acquired title to the land from the Army and began building the air station in response to the military buildup in Europe before World War II. Construction of the base included several iterations of filling the existing tidelands, marshlands, and sloughs with dredge materials from the San Francisco Bay (Tetra Tech EM Inc. [Tetra Tech] 1998).

Following the end of the war in 1945, the installation continued its primary mission of providing facilities and support for fleet aviation activities. During its operations as an active naval base, the installation provided berthing for Pacific Fleet ships and was a major center of naval aviation. Regulatory history, location of OU-2B sites, site descriptions, and future land use are presented in the following subsections.

3.1 REGULATORY HISTORY

The Navy began site investigations at Alameda Point under the Navy Assessment and Control of Installation Pollutants (NACIP) program in 1982. On June 6, 1988, the Navy received a Remedial Action Order from the California Department of Health Services (now the DTSC) that identified a total of 20 sites, including the four OU-2B sites, as needing an RI/FS in conformance with the requirements of CERCLA. In 1988, the Navy converted its NACIP program into the Installation Restoration Program to be more consistent with CERCLA. Alameda Point was identified for closure in September 1993, and all naval operations ceased in April 1997. In July 1999, Alameda Point was identified as a National Priority List site (EPA 1999a). The Navy currently is conducting an investigation in accordance with CERCLA (EPA 1988) at 28 CERCLA sites. As a management tool to accelerate site investigation, cleanup, and reuse, the Base Realignment and Closure (BRAC) Cleanup Team (BCT) at Alameda Point developed a comprehensive OU strategy, which separates the 28 CERCLA sites into a total of 10 OUs (OU-1, OU-2A, OU-2B, OU-2C, OU-3, OU-4A, OU-4B, OU-4C, OU-5, and OU-6). Sites 3, 4, 11, and 21 were designated as OU-2B sites because they are adjoined and have high reuse potential.

3.2 OPERABLE UNIT 2B SITE DESCRIPTIONS

Alameda Point is located at the west end of Alameda Island, which lies at the base of a gently westward-sloping plain that extends from the Oakland-Berkeley hills on the east to the shore of the San Francisco Bay on the west. The San Francisco Bay also borders the island to the south and the Oakland Inner Harbor borders the island to the north. The base is rectangular in shape and is approximately 2 miles long and 1 mile wide. Approximately 1,526 acres of Alameda Point is above water, and 1,108 acres is below water in lagoons and harbor areas. OU-2B is located on the southwestern portion of the Alameda Point facility (see Figure F.3-1).

The four sites (Sites 3, 4, 11, and 21) that comprise OU-2B are described in the following text.

3.2.1 Site 3 Description

Site 3 is a 9.7-acre fenced area on the north side of OU-2B; the site is relatively flat and is largely developed. Site features include: Buildings 112, 119, 337, 512B, 517, 517A, 527, and 564; Structures 71 and 175; almost a dozen areas that were occupied by former buildings; and aboveground storage tanks (AST) and underground storage tanks (UST). Building 112 (33,657-square-feet [ft²]) was used for a painting and ship repair facility. Building 119 (4,700-ft²) is a restaurant. Building 337 (840-ft²) was used for a chemical supply storehouse. Building 512B (4,500-ft²) is a garden shop and storage facility. Building 517 (8,208-ft²) was used as a garden shop. Building 517A (500-ft²) was used for garden equipment storage and office space. Building 527 (8,400-ft²) is a credit union currently leased by the Alameda Reuse and Redevelopment Authority (ARRA). Building 564 (8,736-ft²) currently is leased by ARRA for use as a church. Structure 71 is a mounted A-7 aircraft monument that was constructed in 1987. Structure 175 (99-ft²) is a transformer house with a concrete floor. The sources of contaminants at Site 3 are five 10,000-gallon underground storage tanks. Additional details pertaining to Site 3 can be found in Section 5.0 of the main text of the RI report for OU-2B.

3.2.2 Site 4 Description

Site 4 is approximately 14 acres in size and located on the southeastern side of OU-2B. Site features include: Buildings 163A, 170, 360, 360A, 360B, 360C, 360D, 372, 414, and 610; Structures 552 and 587; an area that was occupied by former Building 107; ASTs; and USTs. Building 163A (12,156-ft²) was used for plant services, aircraft overhaul, maintenance, and as a garage. Building 170 (92,000-ft²) was used for aviation equipment storage and packaging. The north portion of the building is currently being leased by ARRA. Building 360 (180,000-ft²) was used as an aircraft engine and air frame overhaul facility. Buildings 360A, 360B, 360C, and 360D are each 544-ft² in size and were used to store engine components. Building 372 (18,500-ft²) was used as a engine testing facility. Building 414 (1,640-ft²) was used by the Naval Area Rework Facility (NARF) to store paints, solvents, cleaners, strippers, caustics, and abrasive blast media. Building 610 (1,800-ft²) was used as a high-speed grinding shelter. Structure 552 (28,566-ft²) was the former primary electrical substation. Structure 587 was the Industrial Waste Pump Station 2. Additional details pertaining to Site 4 can be found in Section 6.0 of the main text of the RI report for OU-2B.

3.2.3 Site 11 Description

Site 11 is approximately 5.3 acres in size and located on the southwest corner of OU-2B. Site features include: Buildings 14, 265, and 627; areas that were occupied by former Buildings 180 and 587; and several ASTs and USTs. Building 14 (62,000-ft²) was used for aircraft testing and repair and is currently leased by ARRA. Building 265 (251-ft²) was used by plant services for aircraft overhaul. Building 627 (1,200-ft²) was used as an engine storage facility. Former Building 587 was an industrial waste pump station and former Building 180 was a pumping station and an office that was approximately 200-ft² in size. Additional details pertaining to Site 11 can be found in Section 7.0 of the main text of the RI report for OU-2B.

3.2.4 Site 21 Description

Site 21 is approximately 7 acres in size and is located on the northwest corner of OU-2B. Site features include: Buildings 113, 162, and 398; Structure 470; an area occupied by former Building 349; and several ASTs and USTs. Building 113 (13,115-ft²) was used for jet engine container overhaul and is currently leased by ARRA. Building 162 is a 107,029-ft² building that was used for overhauling and repairing engines. Building 398 (31,900-ft²) was used to test as an aircraft engines; it is currently leased by ARRA. Structure 470 (384-ft²) was used for aircraft and engine overhaul. Former Building 349 was a 4,000 ft² aircraft overhaul, repair, and fuel system accessory building. Additional details pertaining to Site 21 can be found in Section 8.0 of the main text of the RI report for OU-2B.

3.3 FUTURE LAND USE FOR SITES WITHIN OPERABLE UNIT 2B

The four sites that comprise OU-2B (Sites 3, 4, 11, and 21) are located in the southwestern portion of Alameda Point (see Figure F.3-2). The planned reuse of these sites (see Figure F.3-3)

was determined by ARRA (EDAW Inc. 1996) in the "NAS Alameda Community Reuse Plan" adopted January 31, 1996. Under that reuse plan Alameda Point was divided into the following seven geographical land use areas:

- Civic Core
- Main Street Neighborhoods
- Inner Harbor
- North Waterfront
- Marina District
- Northwest Territories
- Wildlife Refuge

According to the reuse plan (EDAW Inc. 1996), Sites 3, 4, 11, and 21 are included in the Inner Harbor, Marina District, and Civic Core land use areas (see Figure F.3-3). Redevelopment of the area encompassing OU-2B is planned to consist of a combination of industrial, open space, and community support land uses. OU-2B is planned for mixed use including research and development (R&D), light industrial, supporting retail, office, commercial, and residential redevelopment. Community-oriented institutions such as places of worship and nonprofit organizations are also considered allowable and desirable uses. These descriptions were used to guide selection of receptors, emphasizing the major intended reuse as described by ARRA (EDAW Inc. 1996).

4.0 DATA SELECTION AND METHODS FOR IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN

Evaluating site-specific data is the first step in determining COPCs for the HHRA. Soil and groundwater sampling data were collected within and near the sites during several sampling efforts. Soil gas data were also collected; however, based upon agreements with the regulatory agencies, the soil gas data are not used in the HHRA. Data collected from 1990 to 2003 are summarized in Section 3.0 of the RI report and were used to characterize the sites.

4.1 DATA SELECTION RULES

In general, data were collected and analyzed in accordance with EPA Contract Laboratory Program (CLP) procedures, and detection limits (sample quantitation limits [SQL]) were sufficiently low to permit identification of potential health risks. Independent reviewers validated all data used in this HHRA and assigned data qualifiers with respect to laboratory blanks and quality control samples. Samples were analyzed for inorganic chemicals, semivolatile organic chemicals (SVOC), volatile organic chemicals (VOC), pesticides, polychlorinated biphenyls (PCB), and a few select analytes. Chromium speciation was also performed. Sections 5.0 through 9.0 of the RI report describe the results of the sampling and analysis at each OU-2B site and the groundwater, respectively.

4.1.1 Selection of Data: Quality

The results of the data validation process are documented in quality control summary reports maintained by the Navy; all data are presented in Appendix D of the RI report. Data quality assessment and sampling and analysis approaches are described in detail in Section 3.0 of the RI report.

All data without qualifiers and all data qualified as estimated (J) were used in the HHRA. Data qualified as not detected (U) were incorporated into the HHRA by using a proxy concentration of either one-half of the sample quantitation limit (EPA 1989) or a random value determined using stochastic modeling, consistent with EPA directives (2002c), as described in Section 5.3. Consistent with EPA guidance, only data qualified as rejected were considered unusable for risk assessment purposes (EPA 1989, 1992a). Only validated data sets for soil and groundwater were used in the HHRA for the OU-2B sites; no data that were rejected (R-qualified) by the laboratory or the independent data validator were used in the HHRA.

4.1.2 Selection of Data: Data Quality Objectives

Site-specific data meeting established data quality objectives (DQO) were used in the HHRA. In general, field data, screening-level data, and data collected to characterize waste streams are not used in the HHRA. In some site-specific cases, certain data that are considered to be of “field” or “screening-level” quality (such as organic direct-push groundwater grab samples) were included (provided such results were validated) where more definitive data are lacking.

4.1.3 Selection of Data: Duplicate Data

Where duplicate analyses were collected to assess laboratory precision, only the original sample result was retained in the HHRA data set. This approach ensured that replicate measurements of the same spatial location were not included in the statistical analyses and risk calculations. A review of the OU-2B data sets used in the HHRA allowed this procedure to streamline the statistical evaluations. Overall, no significant precision problems were identified in the HHRA data sets.

4.1.4 Selection of Data: Temporal Scales

For soil and groundwater, all Level III data that met established DQOs (see Section 3.0 of the RI report) were used in the HHRA data set. In addition, Level II groundwater data verified in a fixed laboratory (i.e., data gap sampling data) were included in the HHRA data set. This approach ensures that the process does not eliminate any analytes that may have historically affected the site. This approach is conservative because it does not account for the natural attenuation of organic compounds, remedial activities to remove potential sources, and other processes that tend to decrease concentrations over time.

Details pertaining to soil and groundwater data selection are provided in the following sections.

4.2

MEDIUM-SPECIFIC DATA SELECTION: OPERABLE UNIT 2B SOIL

The site boundaries were used to define the soil exposure areas for Sites 3, 4, 11, and 21 for the HHRA. Soil data for each site were aggregated in depth intervals of 0 to 2 feet below ground surface (bgs) and 0 to 8 feet bgs. While the DTSC standard depth interval of 0 to 10 feet bgs typically is evaluated for residential and construction worker receptors, the groundwater table throughout Alameda Point generally is shallower than 8 feet bgs. The depth to the water table at OU-2B during June 2002 was between 6 and 8 feet bgs. Subsurface soils are, therefore, characterized and evaluated only to a depth of 8 feet bgs, as deeper soil depths are consistently below the water table at Alameda Point (Tetra Tech 2001c). Where site-specific overlap of the bottom depth occurred, best professional judgment was used to determine if the termination depth sample was representative of the intended vertical exposure area, as explained in the following text. Specifically, where a sample started at a depth between land surface and 8 feet bgs, but terminated below 8 feet bgs, for example, it was included in the 0 to 8 feet bgs data set if the average of the top and bottom depths was below 8 feet. Samples with a top depth of 8 feet bgs and a bottom depth below 8 feet (lying wholly beneath the 8-foot depth cutoff) were not included in the data set for 0 to 8 feet bgs. All soil sample locations are shown on Figures F.4-1 through F.4-4.

Soil data considered to be inappropriate for use in the HHRA included screening level data, data for soils that are no longer present at the sites, and some historical soil data for PAHs. Mobile laboratory data collected during the supplemental RI data gap sampling investigation in 2001 (Tetra Tech 2002) were also considered adequate for use in the HHRA, as directed by the regulatory agencies (EPA 2005b). These data were also verified in a fixed laboratory and received a cursory validation (Level II). Data for soils that are no longer present at the sites because of removal actions were not included because they do not reflect current conditions at the sites.

Because some historical data for polynuclear aromatic hydrocarbons (PAH) at OU-2B sites at Alameda Point were observed to have elevated detection limits, historic PAH data were excluded from the HHRA. Instead, additional PAH sampling of the CERCLA sites was conducted in the summer of 2003. Because these PAH data achieved detection limits that meet the DQOs for the RIs (that is, detection limits were less than EPA Region IX preliminary remediation goals [PRG]; see EPA 2004b), the HHRA relied on the low-detection limit PAH data rather than historic data. The new PAH data met all data usability requirements. All soil sampling locations are shown on Figures F.4-1 through F.4-4.

4.3

SITE-SPECIFIC GROUNDWATER DATA SELECTION

The OU-2B boundary was used to define the groundwater data set for the HHRA. Groundwater exposure was evaluated on a plume-by-plume basis, with Plumes 1 and 2 comprising the potential exposure. The groundwater data set for the HHRA only included direct-push and groundwater monitoring well data from within the plume boundaries because data concentrated within the plume boundaries provide a more conservative estimate of risk under potential future scenarios in which a well or a residence could be placed at the center of a plume.

4.4

CHEMICALS OF POTENTIAL CONCERN DETERMINATION

Following the data evaluation, chemicals were identified as COPCs. COPCs are chemicals that are carried through the quantitative exposure and risk analysis portions of the HHRA. Only chemicals in soil or groundwater considered to be essential human nutrients (calcium, magnesium, potassium, and sodium) were excluded as COPCs. Neither the EPA Integrated Risk Information System (IRIS), an on-line database that contains EPA-approved reference doses (RfD) and cancer slope factors (SF) (EPA 2005a), nor DTSC recommends toxicity values for these chemicals. It is unlikely that environmental exposures to essential nutrients would result in deleterious effects to potential receptors. All other chemicals detected in soil or groundwater were retained for evaluation in the HHRA.

5.0 EXPOSURE ASSESSMENT

An exposure assessment identifies potential human receptors that could be exposed to site-related chemicals as well as the routes, magnitude, frequency, and duration of the potential exposures. The conceptual site model (CSM) depicts potential transport mechanisms from each primary source (Figure F.5-1). The following components are included in the CSM: the identification of known or suspected sources of impact, potential chemical transport and exposure pathways, and receptors with associated routes of intake. Tracking of chemical migration from sources to human health receptors is an important use of the CSM and forms one basis from which risk-based decisions are evaluated.

An evaluation of all possible human exposures is necessary to identify receptors that are in current contact with or that could contact environmental media at Alameda Point in the future. The principal objective of this evaluation is to identify reasonable maximum exposure (RME) at Alameda Point (EPA 1992b). As defined by EPA (1989), the RME is the maximum exposure that is reasonably expected to occur at a site. It should be emphasized, however, that the RME exposure applies to a single receptor; therefore, before risks are calculated, there must be a determination as to whether "it is likely that the same individual would consistently face the 'reasonable maximum exposure'" (EPA 1989, emphasis not added). Average or central tendency exposures (CTE) also are calculated and presented separately to provide points of comparison for the RME scenario. In the case of OU-2B at Alameda Point, consideration for a cumulative RME pathway (including both RME groundwater and soil exposure pathways) may be extremely unlikely, given that (for a resident, for example) groundwater is not likely to be used as a whole-house water supply in the future.

Intake variable values for each RME exposure pathway should be "selected so that the combination of all intake variables results in an estimate of the reasonable maximum exposure for that pathway" (EPA 1989). In other words, the most conservative intake variables for each parameter for a given pathway are not necessarily used together. A combination of average and upper-bound values should be combined to estimate exposures that are meaningful and represent the actual RME for the site.

The exposure assessment for Sites 3, 4, 11, and 21 included the following steps:

- Characterization of the exposure settings and identification of potential future human receptors
- Identification of exposure pathways and exposure routes
- Estimation of EPCs
- Quantification of chemical intake for pathway-specific exposures for each potential receptor

In accordance with EPA guidance (1989), all complete exposure pathways were selected for evaluation unless one of the following applies:

- A much higher level of exposure was expected to occur from another pathway involving the same medium at the same exposure point
- The potential magnitude of exposure was expected to be very low
- The probability of any exposures and the potential risks from those exposures were expected to be very low

5.1 EXPOSURE SETTING AND POTENTIAL RECEPTORS

According to EPA (1989), the first step in identifying current or potential future chemical exposures is to evaluate the physical characteristics of the site, such as climate, vegetation, soil type, and hydrology of surface water and groundwater that are pertinent to the risk assessment. Soil and groundwater are the only media of concern at Sites 3, 4, 11, and 21; surface water and sediment are not present within the boundaries of these sites.

5.1.1 Groundwater Use

Although groundwater has been evaluated individually for each site, historical data indicate that shallow groundwater in the East Bay Plain area is affected by high nitrate concentrations and saltwater intrusion (Alameda County Flood Control and Water Conservation District [ACFCWCD] 1988). According to the Alameda Point reuse plan (EDAW Inc. 1996), OU-2B is planned for mixed use including R&D, light industrial, supporting retail, office, commercial, and residential uses. After considering the factors that determine beneficial uses of groundwater and property reuse, the Alameda Point BCT concluded that the groundwater beneath Sites 3, 4, 11, and 21 is not likely to be used as a potential drinking water source. Consequently, the groundwater is not reasonably expected to serve as a public drinking water supply; however, beneficial use of groundwater for drinking water, irrigation, or industrial uses is not prohibited.

Therefore, the most conservative of these potential hypothetical uses (residential whole-house use, including residential ingestion) was retained in this HHRA.

5.1.2 Current Land Use

Although the installation is closed, some security, administrative, and maintenance personnel remain. Occasional recreational activities at the base may include jogging, walking, and picnicking, but these do not occur at OU-2B. Although not associated with Sites 3, 4, 11, and 21, residential housing is located in the northeastern corner of the base. Some buildings on Alameda Point are leased for commercial or industrial use (for example, Building 119 is a restaurant). The current commercial/industrial worker scenario encompasses potential current exposure scenarios at Alameda Point.

5.1.3 Future Land Use

OU-2B is planned for mixed use including R&D, light industrial, supporting retail, office, commercial and residential uses (EDAW Inc. 1996). Community-oriented institutions such as places of worship and nonprofit organizations also are considered allowable and desirable uses.

Commercial/industrial exposures are the most reasonable exposure scenarios for future land use at Sites 3, 4, 11, and 21. Construction worker exposures are also possible and were evaluated. Residential land use has been evaluated for these sites, although the four sites are likely to be developed for mixed land uses. The identification of potential receptors and land reuse has been guided solely by reuse plans for the base (EDAW Inc. 1996).

No parks or recreational facilities are planned for OU-2B. Accordingly, as agreed among the agencies at an OU-2B scoping meeting (Tetra Tech 2001a), recreational receptors were not specifically evaluated in this HHRA. This determination was based, in part, on the fact that no primarily recreational areas are located on OU-2B as well as the fact that the residential assessment is more conservative, given its increased exposure frequencies and durations relative to a recreational scenario.

For Sites 3, 4, 11, and 21, the residential, commercial/industrial, and construction worker exposure scenarios are considered potentially complete based on reuse plans developed for Alameda Point. Exposures to chemicals in soil and groundwater were evaluated for each potential receptor on a site-specific basis.

5.2 EXPOSURE PATHWAYS AND EXPOSURE ROUTES

All relevant exposure pathways were evaluated for future commercial/industrial, construction, and residential exposure scenarios. According to EPA guidance (1989), an exposure pathway consists of four elements:

- A source and mechanism of chemical release

- A retention or transport medium (or media in cases involving transfer of chemicals)
- A point of potential human contact with the contaminated medium (referred to as the exposure point)
- An exposure route (such as ingestion) at the contact point

Eliminating any of these elements (except in a case where the source itself is the point of exposure) results in an incomplete exposure pathway; therefore, if no receptors could contact the source or transport medium, the exposure pathway is incomplete and is not evaluated. Similarly, if human contact with a medium is not possible, the exposure pathway is considered incomplete and is not evaluated. Because many of these pathways are based on future exposures, they are considered potentially complete and are evaluated to provide a conservative estimate of risk. Not all of these pathways may actually be complete for all receptors in the future.

Table F-1.1, Selection of Exposure Pathways (RAGS Part D standard Table 1), indicates the exposure pathways that are complete for each exposure scenario and the rationale for including or excluding each pathway/receptor combination. Routes of potential exposure associated with commercial/industrial, construction, and residential exposures at Sites 3, 4, 11, and 21 are described in the following sections.

5.2.1 Current and Future Commercial/Industrial Worker Exposure

The current commercial/industrial worker (also referred to as the industrial worker) exposure scenario was evaluated for the following pathways in surface soil (0 to 2 feet bgs):

- Incidental ingestion of soil
- Dermal contact with soil
- Inhalation of chemicals adsorbed to windblown soils and volatiles released from soils

Exposure to subsurface soil (0 to 8 feet bgs) for the commercial/industrial worker was evaluated for hypothetical future redevelopment in the event that subsurface soils become surface soils as a result of construction activities and to ensure that the risk assessment provides an estimate of the risks and hazards associated with the most impacted media (subsurface soils were generally more impacted than surface soils). The hypothetical future redevelopment commercial/industrial worker exposure scenario was evaluated for the following pathways in subsurface soil (0 to 8 feet bgs):

- Incidental ingestion of soil
- Dermal contact with soil
- Inhalation of chemicals adsorbed to windblown soils and volatiles released from soils

Current and future commercial/industrial worker exposure scenarios were also evaluated for the following pathway associated with groundwater:

- Inhalation of indoor air vapors from groundwater vapor intrusion

5.2.2 Hypothetical Future Resident (Adult/Child) Exposure

The hypothetical future resident (adult/child) exposure scenario was evaluated for the following pathways in surface soil (from 0 to 2 feet bgs):

- Incidental ingestion of soil
- Dermal contact with soil
- Ingestion of homegrown produce
- Inhalation of chemicals adsorbed to windblown soils and volatiles released from soils

The hypothetical future redeveloped resident (adult/child) exposure scenario was evaluated for the following pathways in subsurface soil (0 to 8 feet bgs) in the event that subsurface soils become surface soils as a result of construction activities:

- Incidental ingestion of soil
- Dermal contact with soil
- Ingestion of homegrown produce
- Inhalation of chemicals adsorbed to windblown soils and volatiles released from soils

All hypothetical future resident (adult/child) exposure scenarios were evaluated for the following pathway associated with shallow groundwater:

- Inhalation of indoor air vapors from groundwater vapor intrusion

All hypothetical future resident (adult/child) exposure scenarios were evaluated for the following pathways associated with groundwater:

- Ingestion as a drinking water source
- Dermal contact during domestic use
- Inhalation of vapors during domestic use

5.2.3 Hypothetical Future Construction Worker Exposure

The hypothetical future construction worker exposure scenario was evaluated for the following pathways in surface soil (from 0 to 2 feet bgs):

- Incidental ingestion of soil
- Dermal contact with soil
- Inhalation of chemicals adsorbed to windblown soils and volatiles released from soils

The hypothetical future redevelopment construction worker exposure scenario was evaluated for the following pathways in subsurface soil (from 0 to 8 feet bgs) in the event that subsurface soils become surface soils because of construction activities:

- Incidental ingestion of soil
- Dermal contact with soil
- Inhalation of chemicals adsorbed to windblown soils and volatiles released from soils

Construction workers will have little to no dermal contact with groundwater because of the average depth to groundwater, which typically occurs at greater than 5 feet bgs. Thus, direct construction worker exposures to groundwater were not assessed in this HHRA. However, the construction worker was assumed to be exposed to VOCs in outdoor air volatilizing from groundwater. Accordingly, future construction worker exposure scenarios were also evaluated for the following pathway associated with groundwater:

- Inhalation of outdoor air vapors from groundwater

5.3 EXPOSURE POINT CONCENTRATIONS

EPCs for chemicals in each medium were estimated for each site using values from the site data set. Based on evaluation of DQOs for data usability, it was determined that a combination of data from a number of different sampling efforts was appropriate. Within each medium, descriptive statistics were calculated for all chemicals detected. In accordance with EPA guidance (EPA 2002c), the 95th percentile upper confidence limit on the arithmetic mean (UCL₉₅) was calculated and used as the EPC in the HHRA to estimate chemical intakes. The UCL₉₅ is defined as a value that, when calculated repeatedly for randomly drawn subsets of site data, equals or exceeds the true mean 95 percent of the time (EPA 1992a). The UCL₉₅ is a better predictor of actual chronic exposure conditions than the maximum concentration because it is based on the probability of long-term random contact with contaminated areas. In areas where the UCL₉₅ exceeded the maximum chemical concentration, however, the maximum concentration was used as the EPC. The following sections set forth the decisions (beyond the

data reduction step) made for developing EPCs according to EPA (2002c) and Navy (2001) guidance.

5.3.1 Distribution Testing

The Shapiro-Wilk W test was conducted for all COPCs with at least five measurements and with detection frequencies greater than or equal to 50 percent. The W test is one of the most powerful tests for determining if a set of measurements follows either a normal or lognormal distribution. The W test computes the correlation between the quantiles of the standard normal distribution and the ordered values of the observed data. When the W statistic is close to 1.0, the observed data essentially follows a straight line when displayed using a normal probability plot. The following null (H_0) and alternative (H_A) hypotheses were tested using the W test, as follows:

H_0 : Data follow a normal distribution

H_A : Data do not follow a normal distribution

Tests were conducted sequentially on data in original and natural-log transformed units. A Type I error rate (alpha) of 0.05 (equivalent to 5 percent) was used to interpret the significance of each test. A Type I error rate of 0.05 means that there is a 5 percent chance that the null hypothesis will be rejected when it is true (that is, the data are normally distributed), leading to the false conclusion that the underlying distribution is not normal. When the test is conducted using log-transformed data, failure to reject H_0 leads to the conclusion that the data follow a lognormal distribution (rejection of H_0 indicates that the data are not lognormally distributed).

Censored (nondetect) data were evaluated using the reporting (or detection) limit for each chemical. Chemicals confirmed as following a normal or lognormal distribution based on the outcome of the W test were listed as "normal" or "lognormal," respectively, in Tables F-3.1 through F-3.10. Chemicals not confirmed as either normal or lognormal were evaluated further by examining normal and lognormal probability plots, outlier box-plots, and frequency histograms. Professional judgment was used to select the distribution that most closely fit the data. Chemicals judged to best fit a normal or lognormal model were listed as "Other [N]" or "Other [T]", respectively, in summary tables. No assessment is conducted for data sets that contain less than 5 samples or that have detection frequencies less than 50 percent; these chemicals were listed as "not tested" in the tables. All EPC statistics are presented in RAGS Part D standard Table 3 format in Tables F-3.1 through F-3.10. EPCs for vapor intrusion to indoor air are presented in Table F1-1 of Attachment F1.

In cases where the sample size is small (approximately 5 to 20 samples, with detection frequencies greater than or equal to 50 percent) and the results of the W test or assessments based on professional judgment indicate that the data do not fit either a normal or lognormal distribution, two options were available: (1) assign a "default" distribution in subsequent calculations or (2) select the distribution that provides the closest relative fit. Selection of lognormal as the default distribution will result in the most conservative (highest) concentrations

when estimating EPCs (see additional discussion below on estimating EPCs using lognormal models for highly skewed data sets). Another option for calculating EPCs was to use a nonparametric bootstrapping technique that is not based on assuming a particular underlying distribution (following EPA 2002c), as discussed in Section 5.3.3.

5.3.2 Summary Statistics (Population Moments) and Proxy Values

The mean, standard deviation, and UCL₉₅ were calculated for samples with at least one detected measurement and a minimum of three samples. Calculations were performed using distribution-dependent formulae. The mean and standard deviation were determined by taking the median values for the mean and standard deviation generated during calculation of the distribution of the UCL₉₅ described previously. The median (50th percentile) and 95th percentile was calculated for all samples, regardless of the detection frequency, using nonparametric assumptions (that is, based strictly on a rank ordering of the combined detected and estimated measurements). The reporting (or detection) limit was substituted as a proxy value for censored data in calculations of the median and 95th percentile concentrations.

For samples with at least 85 percent detected data, one-half the reporting (or detection) limit is substituted as a proxy value for censored (nondetect) data. For samples confirmed or assumed to follow a lognormal distribution - minimum variance, unbiased estimates of the mean and standard deviation were calculated using equations 13.3 and 13.5, respectively (Gilbert 1987). The UCL₉₅ for lognormal distributions was calculated using the Land's method, following Gilbert (1987) and EPA (1992b, 2002c).

For samples with greater than 15 percent censored (reported nondetect) data, population moments were calculated using stochastic modeling, following the "bounding" approach described by EPA (2002c). This approach treats each censored datum as a random variable that can assume any value between zero and its respective reporting (or detection) limit. A Monte Carlo method is used to calculate a minimum of 2,000 values for the UCL₉₅, each time substituting random values for each censored measurement. A distribution of all values for the UCL₉₅ is then constructed, and the minimum, median, 95th percentile, and maximum values were recorded. A small range (difference between the minimum and maximum) for the distribution indicates that censored measurements contribute little to the uncertainty of the estimate. In practice, this is not generally the case, and it is necessary to select a concentration that can be used as a "plausible upper bound" for the UCL₉₅. For Alameda OU-2B, the 95th percentile of the distribution was used as the upper bound concentration. The maximum concentration is not used because it represents the highest concentration that could theoretically be calculated (or nearly so based on 2,000 calculations) from the sample data; therefore, it represents a worst-case concentration rather than a plausible upper bound.

5.3.3 Nonparametric Statistics (Bootstrapping Techniques)

Singh, Singh, and Engelhardt (1997) discuss situations where application of Land's method for calculating the UCL₉₅ of lognormal distributions can result in estimates that are inappropriately high for practical use in risk assessments. These situations are most likely to occur in

populations that are highly skewed (coefficients of variation greater than 1.0). High positive skewness also can be a result of biased sampling, the presence of outliers, or when data represent a mixture distribution of more than one subpopulation (that is, the data are not characteristic of a "true" lognormal distribution). Singh, Singh, and Engelhardt (1997) also add that small sample-sizes (less than 30) can be an additional obstacle further complicating identifying the underlying distribution of the data.

Singh, Singh, and Engelhardt (1997) suggest a number of alternative approaches that might be used in these cases, including the use of bootstrapping, jackknife estimators, and both the central limit and Chebychev's theorems. The protocols recommended for use at Alameda Point acknowledge that there are situations when the underlying distribution cannot be determined with confidence (or use of the lognormal assumption is suspect) and, therefore, they support the use of the nonparametric bootstrap as an alternative means of calculating upper confidence limits of the mean. It is recommended, however, that bootstrapping methods that incorporate some form of bias correction be used in place of the standard bootstrap. An excellent introduction to the bias-corrected and accelerated bootstrap, Hall's bootstrap t , and other approaches are provided by Efron and Tibshirani (1993). Singh, Singh, and Engelhardt (1997) do not address (nor support) application of bootstrapping when censored data are present. Bootstrapping alone does not address the uncertainty inherent in using fixed proxy values in place of data that are less than the detection limit. For this reason, it is recommended that any application of the bootstrap approach with censored data treat each nondetect value as a random variable, which can assume any value between zero and the reporting (or detection) limit. Thus, the recommendations of EPA (2002c) using the "bounding" approach were applied in the calculation of nonparametric EPCs for OU-2B.

5.3.4 Exposure Point Concentration Summary

As mandated in RAGS Part D (EPA 2001b), EPCs for surface soil, subsurface soil, and groundwater (for evaluation of exposure via domestic use) are presented for the RME and CTE scenarios in Tables F-3.1 through F-3.10. EPCs for vapor intrusion to indoor air are presented in Table F1-1 of Attachment F1.

5.4 QUANTIFICATION OF CHEMICAL INTAKE FOR PATHWAY SPECIFIC EXPOSURES FOR EACH POTENTIAL RECEPTOR

In this section of the HHRA, chemical intake rates were estimated for all complete exposure pathways based on the EPCs and on the estimated magnitude of exposure to contaminated media. Exposure is based on "intake," which is defined as the mass of a substance taken into the body per unit body weight per unit time. Intake from a contaminated medium is determined by the amount of the chemical in the medium, the frequency and duration of exposure, body weight, the contact rate, and the averaging time. The following is a generic algorithm that is used to calculate chemical intake:

$$I = \frac{EPC \times CR \times EF \times ED}{BW \times AT}$$

where,

- I = Intake (milligram per kilogram body weight-day [mg/kg-day])
- EPC = Exposure point concentration in contaminated medium (milligram per kilogram [mg/kg] or mg/L)
- CR = Contact or ingestion rate (milligrams soil per day or liters per day)
- EF = Exposure frequency; how often exposure occurs (days per year)
- ED = Exposure duration; how long exposure occurs (years)
- BW = Body weight (kilogram [kg])
- AT = Averaging time; period over which exposure is averaged (days)

Specific equations used to estimate chemical exposures for each complete pathway are presented in Tables F-4.1 through F-4.4.

5.4.1 Standard Exposure Assumptions Used

As previously noted, EPA (1989) requires that exposure parameters used to determine chemical intakes for a given pathway should be selected so that the estimated intake represents the average and RME exposure. Site-specific and EPA default values for exposure parameters were used in the HHRA for Sites 3, 4, 11, and 21. Tables F-4.1 through F-4.4 (the RAGS Part D standard Table 4 series) present the equations and exposure parameters used to estimate chemical intake for residential, commercial/industrial, and construction worker receptors. Default hypothetical future residential and commercial/industrial exposure parameters recommended by EPA Region IX and DTSC were employed, as referenced in detail for each parameter and scenario in the standard RAGS Part D Table 4 format.

RME intakes were calculated for future receptors (including hypothetical future residential, commercial/industrial, and construction worker). The results of these calculations are presented in the site-specific HHRAs in Section 7. CTE exposures also were calculated for comparison purposes and are presented in Attachment F2.

5.4.2 Pathway-Specific Intake Considerations

Chemical intake via ingestion and inhalation is quantified as an administered dose; however, chemical intake from dermal exposure is estimated as an absorbed dose. Dermal contact equations have additional exposure parameters of adherence and absorption factors or permeability constants. Adherence factors indicate the amount of soil that adheres to the skin.

Absorption factors reflect desorption of the chemical from soil and absorption of the chemical across the skin. Permeability constants represent the rate at which a chemical in water penetrates the skin.

EPCs of particulates released from soil to outdoor air were estimated using the soil EPCs as the source term and methodology provided by EPA Region IX in its memorandum describing the derivation of PRGs (EPA 2004b). To derive the EPCs in outdoor air, the soil EPC was multiplied by the reciprocal of the particulate emission factor (PEF), which is a nonchemical-specific value that relates chemical concentrations in soil to airborne concentrations that may be inhaled. A conservative PEF was used, assuming future unvegetated (highly erodable) soils, although this assumption does not reflect current conditions, which is primarily paved or otherwise covered. While the EPC for inhalation of outdoor air particulates is expressed in units of milligrams per cubic meter (mg/m^3), this inhalation EPC is calculated within the intake equation shown in each of the RAGS Part D standard Table 4s.

For residential and commercial/industrial exposures, volatilization of analytes (vapors) into a hypothetical residential or standard commercial/industrial building were also included in the risk evaluations. The EPCs for this pathway were obtained from the groundwater vapor intrusion model (EPA 2003a), which is based on the Johnson and Ettinger model (1991). The model uses site-specific input parameters and default hypothetical residential and commercial/industrial building parameters to estimate an indoor air concentration. The indoor air concentration is then used in the risk assessment to estimate risks from the vapor intrusion pathway. Site-specific input parameters, residential and commercial/industrial building parameters, and a description of the Johnson and Ettinger equation is provided in Attachment F1.

For construction workers, volatilization of analytes (vapors) to outdoor air were evaluated using groundwater data and the American Society for Testing and Materials (ASTM) emission model. Site-specific input parameters and a description of the model are provided in Attachment F1.

Ingestion of homegrown produce was evaluated for the residential exposure scenario. Direct measurements of chemical concentrations in homegrown produce are not available for OU-2B because homegrown produce is not currently grown at Alameda Point. Exposure point concentrations in homegrown produce for the residential exposure scenario were estimated based on chemical concentrations of COPCs in soil using soil-to-plant uptake factors (UF) that estimate the root uptake of chemicals from soil and translocation of chemicals to the edible plant parts. UFs for nonvolatile organic chemicals were developed using DTSC methodology (DTSC 1993b), and UFs for inorganic chemicals were obtained from EPA (EPA 1996a). The EPA guidance provides UFs for 6 inorganic chemicals: arsenic, cadmium, mercury, nickel, selenium, and zinc.

For nonvolatile organic chemicals, it was found that the uptake of organic contaminants could be related to the octanol-water partition coefficient (K_{ow}) and the organic carbon partition coefficient (K_{oc}) of the contaminant and the fraction of organic carbon (F_{oc}) in the soil (Briggs and Others 1982). The equation used to calculate the uptake factor is as follows:

$$UF = \frac{(0.03 \times K_{ow}^{0.77}) + 0.82}{(K_{oc})(F_{oc})}$$

where

UF = Soil-to-plant uptake factor

K_{ow} = Octanol-water partition coefficient (cubic centimeters per gram [cm^3/g])

K_{oc} = Organic carbon-water partition coefficient (cm^3/g)

F_{oc} = Fraction organic carbon content in soil

K_{ow} and K_{oc} values were obtained from EPA's "Soil Screening Guidance: Technical Background Document" (EPA 1996a) and from the documentation for DTSC's CalTOX model, when not available from EPA. F_{oc} was assumed to be 0.1, a value appropriate to soil used for the production of food crops.

Consistent with EPA guidance, an empirical correction factor of 0.01 was applied to lipophilic COPCs to reduce the estimated produce concentration (EPA 1994c, 1998). Lipophilic chemicals are defined as chemicals for which the log K_{ow} is greater than 4. EPA assumes lipophilic chemicals do not readily pass into the edible portions of produce. Chemical-specific uptake factors are presented in Attachment F3.

Risks associated with VOCs were not evaluated for the homegrown produce exposure pathway. VOCs are typically low-molecular-weight compounds that do not persist or bioaccumulate in the environment (EPA 1994c). Because VOCs are typically lost from surface soil through volatilization, soil concentrations measured during the site investigation studies are not representative of concentrations over a 30-year period, which is the exposure duration assumed for the residential exposure scenario. For the purposes of this evaluation, COPCs listed in the EPA PRG table as volatile were considered VOCs (EPA 2004b).

EPA estimates that homegrown fruits and vegetables account for 4 percent and 6.8 percent, respectively, of receptor diets (EPA 1997b). Using the 95th percentile of fruit and vegetable intakes (12 grams per kilogram per day [g/kg-day] and 10 g/kg-day , respectively) to estimate the RME homegrown produce consumption rates, a 70 kilogram adult would ingest 33.6 g/day of homegrown fruits and 47.6 g/day of homegrown vegetables. A 15 kilogram child would ingest 7.2 and 10.2 grams per day of homegrown fruits and vegetables, respectively. Accordingly, the corresponding RME homegrown produce consumption rates (the total of fruit and vegetable consumption rates) are 81.2 grams per day for the adult resident and 17.4 grams per day for the child resident. To evaluate the CTE scenario, EPA recommends intake rates of 3.4 g/kg-day for fruits and 4.3 g/kg-day for vegetables. Applying the same fraction of 4 percent and 6.8 percent of homegrown fruits and vegetables, respectively, in a typical receptor diet as assumed in the

RME scenario, an adult resident in a CTE scenario would ingest 9.5 grams per day of fruits and 20.5 grams per day of vegetables, for a total of 30 grams per day. A child resident in a CTE scenario would ingest 2 grams per day of fruits and 4.4 grams per day of vegetables, for a total of 6.4 grams per day.

EPA suggests that for home gardeners, a high-end dietary fraction of 0.4 is assumed for the ingestion of contaminated fruits and vegetables grown onsite (EPA 1996a). Accordingly, an FI of 0.4 is used for the RME scenario. For the CTE scenario, it is assumed that homegrown produce represents 20 percent of a resident's diet; therefore, an FI of 0.2 is used.

6.0 TOXICITY ASSESSMENT

Standard toxicological methodologies for assessing the toxicity of chemicals involve quantifying the dose-response relationships for adverse human health effects associated with exposure to specific chemicals. There are two categories of toxic chemicals: carcinogenic and noncarcinogenic. While not all chemicals have carcinogenic potential, all are assumed to have some noncarcinogenic effect at a high dose. The potency of carcinogenic chemicals is evaluated and presented separately from noncarcinogenic chemical potency in this Alameda Point OU-2B HHRA.

The toxicity values used in the HHRA were selected based on EPA's most recent guidance, which presently includes the December 2003 EPA Office of Solid Waste and Emergency Response (OSWER) directive for selecting human health toxicity values in Superfund risk assessments (EPA 2003c). The prioritized sources of toxicity values are summarized below:

- EPA's IRIS Values: IRIS is an on-line database that contains EPA-approved RfDs and CSFs (or reference concentrations [RfC] and unit risk factors [URF] converted to RfDs and CSFs) (EPA 2005a). The RfDs and CSFs have undergone extensive review and have agency-wide consensus. Values were verified against IRIS values (EPA 2005a) prior to use.
- EPA's Provisional Peer-reviewed Toxicity Values (PPRTV): PPRTVs are presented in the EPA Region IX PRG table (EPA 2004b). PPRTVs were developed by the Office of Research and Development/National Center for Environmental Assessment, and Superfund Health Risk Technical Support Center when requested by EPA's Superfund program.
- Other EPA and Non-EPA Sources: These sources include Agency for Toxic Substances and Disease Registry's (ATSDR) on-line minimal risk levels (MRL) (ATSDR 2004), Cal/EPA's on-line toxicity criteria database (Office of Environmental Health Hazard Assessment [OEHHA] 2002), and EPA's Health Effects Assessment Summary Tables (HEAST) (1997a).

6.1 REFERENCE DOSES

The potential for adverse noncancer health effects to result from exposure to chemicals was characterized by comparing an exposure estimate (intake) with an RfD. EPA (1989) defines an RfD as an estimate (with uncertainty that spans perhaps an order of magnitude or greater) of a

daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects. The RfDs are expressed in units of mg/kg-day and are specific to the chemical, exposure route (for example, ingestion or inhalation), and exposure duration (chronic or subchronic). The sources of RfDs used in the HHRA for OU-2B (in order of preference) were IRIS (EPA 2005a), PPRTV, and HEAST (EPA 1997a), as described and cited in Section 6. This approach is as adopted by EPA Region IX as the hierarchy for developing PRGs (EPA 2004b).

EPA derives RfDs to assess oral exposures and reference concentrations (RfC) to assess exposure via inhalation and publishes these values and supporting information in IRIS (EPA 2005a) and HEAST (EPA 1997a). The RfCs are concentrations in air expressed in units of mg/m³ and were converted to RfDs using the following equation:

$$RfD = \frac{RfC \times IR}{BW} \quad (6-1)$$

where,

RfD	=	Reference dose (mg/kg)
RfC	=	Reference concentration (mg/m ³)
IR	=	Inhalation rate assumption (20 m ³ /day)
BW	=	Body weight assumption (70 kg)

Consistent with DTSC guidance (1992), oral RfDs were used to assess dermal exposure in the absence of route-specific dermal RfDs. Chronic RfDs are developed for evaluating exposures that occur over periods of more than 7 years, and subchronic RfDs are for exposures of less than 7 years. Although the potential exposures considered in this risk assessment are for periods of from 1 to 30 years, chronic RfDs were used to evaluate both chronic and subchronic exposures. Few subchronic RfDs were available, and the use of only one set of RfDs simplified the analysis.

RfDs and RfCs are derived by EPA work groups. The EPA work groups review all relevant human and animal studies for each chemical and select the study (or studies) pertinent to the derivation of the specific RfD. RfDs are often derived from a measured or estimated no observed adverse effect level (NOAEL). The NOAEL corresponds to the dose, in mg/kg-day, that can be administered without inducing observable adverse effects. If a NOAEL cannot be determined, the lowest observed adverse effect level (LOAEL) is used. The LOAEL corresponds to the lowest daily dose administered that induces an observable adverse effect. The toxic effect characterized by the LOAEL is referred to as the "critical effect."

NOAELs are based most often on data from experimental studies in animals. Both the experimental parameters and the extrapolation of animal data to humans are potential sources of uncertainty; therefore, in deriving an RfD, the NOAEL or LOAEL is divided by uncertainty factors to ensure that the RfD will be protective of human health. The uncertainty factors usually

occur in multiples of 10, and each factor represents a specific area of uncertainty inherent in the extrapolation from available data. Uncertainty factors account for the following:

- Extrapolation of data from animals to humans (interspecies extrapolation)
- Variation in human sensitivity to the toxic effects of a compound (intraspecies differences)
- Derivation of a chronic RfD based on a subchronic rather than a chronic study
- Derivation of an RfD based on a LOAEL rather than a NOAEL

Modifying factors between 0 and 10 may also be applied to accommodate other factors or additional uncertainty associated with the data. For most compounds, the modifying factor is 1. The chronic RfDs used for the Alameda Point OU-2B HHRA are presented in Tables F-5.1 and F-5.2.

6.2 SLOPE FACTORS

The toxicity information considered in the assessment of potential cancer risks includes a weight-of-evidence classification and a SF. The weight-of-evidence classification qualitatively describes the likelihood that a chemical is a human carcinogen and is based on an evaluation of the available data from human and animal studies. Chemicals evaluated by EPA since the publication of the 1996 cancer guidelines, "Proposed Guidelines for Carcinogen Risk Assessment" (EPA 1996b), are evaluated using a weight-of-evidence narrative and one of the following descriptors for classifying potential carcinogenicity to humans: known/likely, cannot be determined, and not likely. Chemicals evaluated by EPA before the publication of the 1996 guidelines were evaluated in accordance with the 1986 guidelines (EPA 1986). These chemicals were classified using an alphanumeric system in which the chemical was assigned to one of five groups: Group A, a known human carcinogen; Groups B1 and B2, a probable human carcinogen; and Group C, a possible human carcinogen. Chemicals that could not be classified as human carcinogens because of lack of data were categorized in Group D; chemicals for which there was evidence of noncarcinogenicity in humans were categorized in Group E.

An SF is an upper bound estimate, approximating the UCL₉₅ of the increased cancer risk from lifetime exposure to a chemical (EPA 1989). The SFs used to assess cancer risk were obtained from IRIS (EPA 2005a).

Similar to RfDs, SFs are specific to the chemical and route of exposure and are available for oral and inhalation exposures. EPA typically publishes inhalation unit risks instead of inhalation SFs. The unit risks were converted to inhalation SFs using the following equation:

$$SF = \frac{UR \times BW \times UCF}{IR} \quad (6-2)$$

where,

SF	=	Slope factor (mg/kg-day) ⁻¹
URF	=	Unit risk factor (μg/m ³)
BW	=	Body weight assumption (70 kg)
UCF	=	Unit conversion factor (1,000 micrograms per milligram)
IR	=	Inhalation rate assumption (20 m ³ /day)

As with RfDs, oral SFs were used to estimate cancer risks for exposures via the dermal route if no dermal SF was available; however, surrogate chemicals were not used to characterize cancer potency. The SFs used in this assessment are presented in Table F-6.1 and F-6.2.

6.3 ROUTE-TO-ROUTE EXTRAPOLATION

For some chemicals, toxicity values are available for only one route of exposure (that is, for only the inhalation or the oral exposure route). In some of these cases, route-to-route extrapolations were conducted so that toxicity values developed for one route of exposure (for example, the oral route) were applied to another (for example, the inhalation route). This approach assumes that toxicity is identical regardless of the route of exposure. Route-to-route extrapolations are recommended for organic analytes by the State of California (DTSC 1992) and are used by EPA Region IX to develop PRGs (EPA 2004b). Although EPA guidance (EPA 1996b) generally does not recommend them (as the procedure does not account for route of administration, target organ, portal of entry effects, and other physical or chemical effects as required by EPA guidance), use of route-to-route extrapolation is consistent with the EPA Region IX approach to developing PRGs. Route-to-route extrapolation in this manner increases the uncertainty of the risk assessment results (see Section 8.3).

As previously mentioned, oral RfDs and SFs were used to quantify effects associated with dermal exposures for all COPCs because dermal toxicity values have not been developed. Route-to-route extrapolations also were used for organic COPCs in the following cases:

- If an organic oral toxicity value (RfD or SF) but no inhalation toxicity value was available, the oral toxicity value also was used as the inhalation toxicity value.
- If an organic inhalation toxicity value but no oral toxicity value was available, the inhalation toxicity value also was used as the oral toxicity value.

Such route-to-route extrapolations were not used for metals because their toxicological endpoints are heavily dependent on the exposure route (EPA 2004b). Route-to-route extrapolations for

organic compounds and other exceptions to the RfDs and SFs used in the HHRA are denoted with an "R" (for route extrapolated) in Tables F-5.1 through F-6.2.

Agency-developed CSFs and RfDs apply specifically to risk estimates associated with ingestion and inhalation of chemical substances and are, with few exceptions, based on administered doses. CSFs or RfDs have not been developed specifically for dermal exposure. In accordance with recommendations prescribed by EPA (2004a), dermal RfDs and CSFs representing the toxicity of the absorbed dose were derived by multiplying corresponding oral RfDs or CSFs by an appropriate gastrointestinal ABS value. In general, COPCs without gastrointestinal ABS values or with gastrointestinal ABS values greater than 50 percent were assigned a gastrointestinal ABS value of 100 percent to derive a dermal value. When a range of gastrointestinal ABS values was available from EPA (2004a), the lowest number in the range was used.

6.4 SURROGATES

The following surrogates were employed to avoid leaving data gaps in the HHRA (EPA 2004b):

- Cis-1,2-Dichloroethene (1,2-DCE) was used as a surrogate for total 1,2-DCE, which does not have chemical-specific toxicity factors.
- The IRIS cancer slope factors for 2,4-/2,6-dinitrotoluene mixture were used as surrogate values for 2,4-dinitrotoluene as a conservative measure.
- The IRIS reference dose for DDT was used to evaluate 4,4'-DDD and 4,4'-DDE, which do not have reference doses.
- While not completely a surrogate as such, the values for trivalent chromium were used to evaluate chromium, since hexavalent chromium was speciated and evaluated separately.
- 4-Bromophenyl-phenylether and 4-chlorophenyl-phenylether do not have EPA Region IX PRGs or chemical-specific toxicity factors and were not evaluated; however, they are not suspected to be associated with any former processes at the site.
- Total xylenes were used as the surrogate for all xylene isomers (including m-, p- and o-xylenes) that do not have chemical-specific toxicity factors.
- Methyl isobutyl ketone was used as a surrogate for 2-hexanone, which does not have chemical-specific toxicity factors.
- Free cyanide was used as the surrogate for cyanide, which does not have chemical-specific toxicity factors.
- Acenaphthene was used as the surrogate for acenaphthylene, which does not have chemical-specific toxicity factors.
- Anthracene was used as the surrogate for phenanthrene, which does not have chemical-specific toxicity factors.
- Pyrene was used as the surrogate for benzo(g,h,i)perylene, which does not have chemical-specific toxicity factors.

- 1,2,4-Trichlorobenzene was used as the surrogate for 1,2,3-trichlorobenzene, which does not have chemical-specific toxicity factors.

6.5 LEAD

No consensus-based toxicity values are available for lead, which is a contaminant of particular toxicological concern wherever child receptors and other sensitive subpopulations may come into contact with lead-contaminated media. The potential for human health effects caused by lead is typically estimated on the basis of blood-lead concentrations. Mathematical models have been developed to estimate blood-lead levels on the basis of total lead uptake from exposures by diet, drinking water, air, and soil. The risk characterization findings related to lead are presented in Section 7, which also discusses the Cal-modified residential PRG of 150 mg/kg, where lead was a COPC. The maximum detected groundwater concentration was compared to the EPA acceptable drinking water limit (based on a treatment technique standard of 15 µg/L (EPA 2003c), which is not a risk-based value.

6.6 TOXICITY PROFILES

Toxicity profiles for COPCs for Sites 3, 4, 11, and 21 are provided in Attachment F4. Rather than discussing information for all detected chemicals, the toxicity assessment focused on COPCs, and in particular, risk drivers for OU-2B. A summary of toxicity values for any chemical selected as a COPC for at least one OU-2B site in at least one medium is also provided in Tables F-5.1 through F-6.2.

6.7 TOTAL PETROLEUM HYDROCARBONS

While TPH was sampled and detected in various media at some OU-2B sites, Alameda Point risk assessments follow Superfund and DTSC guidance (DTSC 1993a) in assessing the toxicity of nondiscrete TPH. Specifically, evaluation of TPH is not required for CERCLA assessments in California where the chemical-specific indicator compounds (for example, BTEX and PAHs) are already assessed (DTSC 1993a).

7.0 RISK CHARACTERIZATION

The final step in the HHRA is the characterization of potential risks associated with exposure to chemicals detected at a site. Noncancer health hazards and cancer risks are characterized separately. The general methodology for estimating HIs and cancer risks is presented in Sections 7.1 and 7.2. As indicated previously in Section 6.5, lead is evaluated separately, as described in Section 7.3. The subsections of Section 7.4 present specific results for the HHRA that were conducted for Sites 3, 4, 11, and 21.

7.1

CHARACTERIZATION OF NONCANCER HAZARDS

For chemicals that are not classified as carcinogens and for those carcinogens known to cause adverse health effects other than cancer, the potential for exposure to result in adverse health effects other than cancer is evaluated by comparing the intake with an RfD. When calculated for a single chemical, the comparison yields a ratio termed the HQ:

$$\text{Hazard Quotient} = \frac{\text{Intake (mg/kg-day)}}{\text{RfD (mg/kg-day)}} \quad (7-1)$$

To evaluate the potential for adverse health effects other than cancer from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI as follows:

$$\text{Hazard Index} = \sum HQ \quad (7-2)$$

Pathway-specific HIs are then summed to estimate a total HI for each receptor identified at a site. If the total HI exceeded 1.0, further evaluation in the form of a segregation of HI analysis may be performed to determine if the noncancer HIs are a concern at a site (EPA 1989).

7.2

CHARACTERIZATION OF CANCER RISKS

Risks associated with exposure to chemicals classified as carcinogens are estimated as the incremental probability that an individual will develop cancer over a lifetime as a direct result of an exposure (EPA 1989). The estimated risk is expressed as a unitless probability.

To aid in the interpretation of the results of the risk assessment, EPA guidance on exposure levels considered protective of human health is presented. In the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA defined general remedial action goals for sites on the National Priorities List (Title 40 of the *Code of Federal Regulations* Part 300.430). The goals include a range for residual carcinogenic risk, which is "an excess upper-bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} ," or 1 in 10,000 to 1 in 1,000,000. The goals set out in the NCP are applied once a decision to remediate a site has been made. A more recent EPA directive (EPA 1991b) provides additional guidance on the role of the HHRA in supporting risk management decisions, and in particular, determining if remedial action is necessary at a site. Specifically, the guidance states, "Where cumulative carcinogenic site risk to an individual based on the RME for both current and future land use is less than 10^{-4} , and the noncancer HQ is less than 1, action generally is not warranted unless there are adverse environmental impacts." EPA Region IX has stated, however, that action may be taken to address risks between 10^{-4} and 10^{-6} . For that reason, the range between 10^{-4} and 10^{-6} is referred to as the "risk management range" in this HHRA.

For chemicals classified as carcinogens, three steps are used in estimating cancer risks. First, to derive a cancer risk estimate for a single chemical and pathway, the chemical intake is multiplied by the chemical-specific SF. The calculation is based on the following relationship:

$$\text{Chemical-Specific Cancer Risk} = \text{Intake (mg/kg-day)} \times \text{SF (mg/kg-day)}^{-1} \quad (7-3)$$

Second, to estimate the cancer risk associated with exposure to multiple carcinogens for a single exposure pathway, the individual chemical cancer risks are assumed to be additive, as follows:

$$\text{Pathway-Specific Cancer Risk} = \sum \text{Chemical-Specific Cancer Risk} \quad (7-4)$$

Third, pathway-specific risks are summed to estimate the total cancer risk.

7.3 CHARACTERIZING HEALTH EFFECTS ASSOCIATED WITH EXPOSURE TO LEAD

Blood lead concentrations were calculated for the applicable receptors from exposures to lead using LeadSpread 7 (DTSC 1999), the DTSC's lead risk assessment tool. LeadSpread estimates intake and corresponding blood lead levels via equations that link incremental blood lead increase to a concentration in an environmental medium. The following exposure pathways are included in the uptake model: dietary intake, drinking water, soil and dust ingestion, inhalation, and dermal contact. Default background or regulatory screening concentrations of lead in media can be used, or environmental concentrations can be input using site-specific values for the various media. Default lead concentrations in the model that remain in the calculations unless changed by the user include the DTSC MCL of 15 µg/L in drinking water, the highest monthly average value from a California monitoring station of 0.028 µg/m³ for ambient air, and a respirable dust concentration of 1.5 µg/m³, based on soil screening guidance (EPA 1996a). Soil and groundwater EPCs established in the RAGS Part D Table 3s provide the lead concentrations used in the evaluation. In addition, risk from ingestion of site soil and East Bay Municipal Utility District (EBMUD) drinking water, which has a lead concentration of 0.15 micrograms per liter (µg/L), was used. The groundwater lead EPC for Plume 1 was evaluated for all four sites of OU-2B (Sites 3, 4, 11, and 21); however, only Site 3 contained an additional LeadSpread evaluation of lead in Plume 2.

The 95th percentile was used as the cutoff for acceptable lead risks. That is, acceptable lead levels are defined as those that produce a blood-lead concentration greater than 10 micrograms per deciliter (µg/dL) in no more than 5 percent of the exposed child population. The LeadSpread blood lead modeling results for all sites are presented in Attachment F5.

7.4 SITE-SPECIFIC RISK CHARACTERIZATION: RISK ASSESSMENT RESULTS

The subsections that follow present carcinogenic risks and noncarcinogenic hazards associated with RME exposure for Sites 3, 4, 11, and 21. Surface and subsurface soil results are presented in Section 7.4.1. Domestic use groundwater results and vapor intrusion from groundwater to

indoor air results are presented in Section 7.4.2. Potential effects from exposure to lead are presented in Section 7.4.3. The uncertainty associated with risk drivers is discussed in Section 8.3. Carcinogenic risks and noncancer hazards associated with CTE exposures are presented in a separate attachment (see Attachment F2).

The estimate of cancer risk for the future residential exposure scenario is the sum of the risks estimated for the child and adult receptors, whereas the noncancer HI is based on total HI estimated for the child receptor. Childhood noncancer risks are always higher than adult noncancer risks, given a child's higher intake per unit body mass.

7.4.1 Surface and Subsurface Soil

Consistent with the exposure assessment (Section 5), both current and future exposures were evaluated for Sites 3, 4, 11, and 21. Carcinogenic risks and noncancer hazards are summarized in the following text and in formal RAGS Part D-required tables (see Tables F-7.1.1 through F-10.4.8).

7.4.1.1 Soil Evaluation for Site 3

Current Commercial/Industrial Worker

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 1×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.1.1). Most of the carcinogenic risk is attributable to arsenic, Aroclor-1260, and benzo(a)pyrene, which are the only analytes with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Arsenic was not considered significantly greater than background for Site 3. The carcinogenic risk not attributable to background levels of arsenic was 8×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 0.4, which is less than the risk management HI of 1 for noncarcinogens.

Hypothetical Future Construction Worker

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 1×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.1.2). Most of the carcinogenic risk (6×10^{-7}) is attributable to arsenic. Arsenic was not considered significantly greater than background for Site 3. The carcinogenic risk not attributable to background levels

of arsenic was 8×10^{-7} , which is below the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 1, which is equal to the risk management HI of 1 for noncarcinogens and is attributable primarily to arsenic (see Table F-9.1.2). No individual COPC exceeds an HQ of 1. The noncarcinogenic HI not attributable to background levels of arsenic and other metals present at concentrations consistent with background was 0.8, which is below the risk management HI of 1 for noncarcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

Hypothetical Future Resident

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 7×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Tables F-9.1.3 and F-9.1.4). Most of the carcinogenic risk (5×10^{-5}) is attributable to arsenic. Arsenic was not considered significantly greater than background for Site 3. The carcinogenic risk not attributable to background levels of arsenic was 3×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods). PAHs (Benzo[a]pyrene, benzo[a]anthracene, and dibenzo[a,h]anthracene) and Aroclor-1260 were the other analytes with an estimated carcinogenic risk greater than the 1×10^{-6} risk level.

The HI from exposure to surface soil is 5, which exceeds the risk management HI of 1 for noncarcinogens. Aroclor-1260 is the only COPC with an HQ exceeding 1. The HI not attributable to Aroclor-1260 and metals present at background concentrations is 1, which is equal to the risk management HI.

Hypothetical Future Redeveloped Commercial/Industrial Worker

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 2×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.1.5). Most of the carcinogenic risk is attributable to arsenic, Aroclor-1260, and benzo(a)pyrene, which are the only analytes with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Arsenic was not considered significantly greater than background for Site 3. The carcinogenic risk not attributable to background levels of arsenic was 9×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to subsurface soil is 0.5, which is less than the risk management HI of 1 for noncarcinogens (see Table F-9.1.5).

Hypothetical Future Redeveloped Construction Worker

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 2×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.1.6). Most of the carcinogenic risk (1×10^{-6}) is attributable to arsenic. Arsenic was not considered significantly greater than background for Site 3. The carcinogenic risk not attributable to background levels of arsenic was 8×10^{-7} , which is below the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 1, which is equal to the risk management HI of 1 for noncarcinogens and is attributable primarily to arsenic (see Table F-9.1.6). No individual COPC exceeds an HQ of 1. The noncarcinogenic HI not attributable to background levels of arsenic and other metals consistent with background was 0.7, which is below the risk management HI of 1 for noncarcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

Hypothetical Future Redeveloped Resident

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 1×10^{-4} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Tables F-9.1.7 and F-9.1.8). Most of the carcinogenic risk (1×10^{-4}) is attributable to arsenic. Arsenic was not considered significantly greater than background for Site 3. The carcinogenic risk not attributable to background levels of arsenic was 3×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods). PAHs (Benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene and dibenzo[a,h]anthracene) Aroclor-1260, and benzene were the other analytes with an estimated carcinogenic risk greater than the 1×10^{-6} risk level.

The HI from exposure to subsurface soil is 6, which exceeds the risk management HI of 1 for noncarcinogens. Arsenic and iron are the only COPCs with individual HQs exceeding 1. Arsenic was not considered significantly greater than background for Site 3. Although iron was considered significantly greater than background at Site 3, the RME EPC for iron (24,800 mg/kg) is within the range of detected iron concentrations in the background data set (4,500 to 27,900 mg/kg) (see Appendix E of the RI report for a discussion of background comparison methods). The HI not attributable to iron and metals present at background concentrations is 2, which exceeds the risk management HI.

7.4.1.2 Soil Evaluation for Site 4

Current Commercial/Industrial Worker

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 4×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.2.1). Most of the carcinogenic risk (2×10^{-6}) is attributable to arsenic, which is the only analyte with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Arsenic was not considered significantly greater than background for Site 4. The carcinogenic risk not attributable to arsenic was 1×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 0.2, which is below the risk management HI of 1 for noncarcinogens.

Hypothetical Future Construction Worker

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 4×10^{-7} , which is below the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.2.2). Most of the carcinogenic risk (2×10^{-7}) is attributable to arsenic. Arsenic was not considered significantly greater than background for Site 4. The carcinogenic risk not attributable to background levels of arsenic was 1×10^{-7} , which is below the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 0.5, which is below the risk management HI of 1 for noncarcinogens.

Hypothetical Future Resident

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 1×10^{-4} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Tables F-9.2.3 and F-9.2.4). Most of the carcinogenic risk (1×10^{-4}) is attributable to N-nitroso-di-n-propylamine, which was detected in 1 of 67 surface soil samples. The carcinogenic risk from N-nitroso-di-n-propylamine is based upon the maximum detected concentration of 0.18 mg/kg, and is attributed primarily from the ingestion of homegrown produce pathway, which is a highly uncertain exposure pathway. Arsenic and benzo(a)pyrene are the only other analytes with an estimated carcinogenic

risk greater than the 1×10^{-6} risk level. The carcinogenic risk attributable to arsenic and benzo(a)pyrene is 2×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens.

The HI from exposure to surface soil is 4, which is greater than the risk management HI of 1 for noncarcinogens and is primarily attributable to cadmium (see Table F-9.2.4). Cadmium is considered significantly greater than background at Site 4. The HI not attributable to cadmium and metals present at background concentrations is 0.4, which is below the risk management HI of 1.

Hypothetical Future Redeveloped Commercial/Industrial Worker

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 8×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.2.5). Most of the carcinogenic risk is attributable to arsenic and trichloroethylene, which are the only analytes with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Arsenic was not considered significantly greater than background at Site 4 (see Appendix E of the RI report for a discussion of background comparison methods). The carcinogenic risk not attributable to arsenic is 5×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens.

The HI from exposure to subsurface soil is 0.2, which is less than the risk management HI of 1 for noncarcinogens (see Table F-9.2.5).

Hypothetical Future Redeveloped Construction Worker

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 7×10^{-7} , which is less than the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.2.6). The carcinogenic risk is attributable primarily to arsenic (3×10^{-7}). Arsenic was not considered significantly greater than background for Site 4. The carcinogenic risk not attributable to background levels of arsenic was 4×10^{-7} , which is below the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to subsurface soil is 0.6, which is below the risk management HI of 1 for noncarcinogens (see Table F-9.2.6).

Hypothetical Future Redeveloped Resident

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 2×10^{-4} , which exceeds risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Tables F-9.2.7 and F-9.2.8). Most of the carcinogenic risk (1×10^{-4}) is attributable to N-nitroso-di-n-propylamine, which was detected in 2 of 165 soil samples at Site 4. The carcinogenic risk from N-nitroso-di-n-propylamine is based upon the maximum detected concentration of 0.18 mg/kg, and is attributed primarily from the ingestion of homegrown produce pathway, which is a highly uncertain exposure pathway. 2,4-dinitrotoluene, 3,3'-dichlorobenzidine, Aroclor-1254, arsenic, and benzo(a)pyrene are other analytes with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Excluding the ingestion of homegrown produce pathway, the carcinogenic risk is 1×10^{-5} , which is within the risk management range.

The HI from exposure to subsurface soil is 4, which is greater than the risk management HI of 1 for noncarcinogens and is primarily attributable to cadmium (see Table F-9.2.8). Cadmium is considered significantly greater than background at Site 4. The HI not attributable to cadmium and metals present at background concentrations is 0.6, which is below the risk management HI of 1. (see Table F-9.2.8).

7.4.1.3 Soil Evaluation for Site 11

Current Commercial/Industrial Worker

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 1×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.3.1). Most of the carcinogenic risk is attributable to arsenic (1×10^{-6}) and benzo(a)pyrene (5×10^{-6}), which were the only analytes with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Arsenic was not considered significantly greater than background for Site 11; the carcinogenic risk not attributable to arsenic in surface soil was 8×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 0.2, which is below the risk management HI of 1 for noncarcinogens (see Table F-9.3.1).

Hypothetical Future Construction Worker

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 1×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.3.2). Most of the carcinogenic risk is attributable to arsenic (2×10^{-7}) and benzo(a)pyrene (7×10^{-7}). Arsenic was not considered significantly greater than background for Site 11; the carcinogenic risk not attributable to arsenic in surface soil was 8×10^{-7} , which is less the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 0.5, which is less than the risk management HI of 1 for noncarcinogens (see Table F-9.3.2).

Hypothetical Future Resident

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 4×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Tables F-9.3.3 and F-9.3.4). Most of the carcinogenic risk is attributable to arsenic (1×10^{-5}) and benzo(a)pyrene (2×10^{-5}). Arsenic was not considered significantly greater than background for Site 11; the carcinogenic risk not attributable to arsenic in surface soil was 3×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods). Aroclor-1260, benzo(a)anthracene, and dibenzo(a,h)anthracene are the only analytes with carcinogenic risks exceeding the 1×10^{-6} risk level.

The HI from exposure to surface soil is 2, which is greater than the risk management HI of 1 for noncarcinogens. No individual analytes have a chemical-specific HQ exceeding 1. The HI not attributable to metals present at background concentrations is 1, which is equal to the risk management HI.

Hypothetical Future Redeveloped Commercial/Industrial Worker

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 8×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.3.5). Most of the carcinogenic risk is attributable to arsenic (2×10^{-6}) and benzo(a)pyrene (4×10^{-6}), which were the only analytes with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Arsenic was not considered significantly greater than background for Site 11; the carcinogenic risk not

attributable to arsenic in surface soil was 6×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to subsurface soil is 0.1, which is less than the risk management HI of 1 for noncarcinogens (see Table F-9.3.5).

Hypothetical Future Redeveloped Construction Worker

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 8×10^{-7} , which is below the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.3.6). Most of the carcinogenic risk is attributable to arsenic (2×10^{-7}) and benzo(a)pyrene (4×10^{-7}). Arsenic was not considered significantly greater than background for Site 11; the carcinogenic risk not attributable to arsenic in subsurface soil was 6×10^{-7} , which is less than the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to subsurface soil is 0.4, which is below the risk management HI of 1 for noncarcinogens (see Table F-9.3.6).

Hypothetical Future Redeveloped Resident

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 4×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Tables F-9.3.7 and F-9.3.8). Most of the carcinogenic risk is attributable to arsenic (1×10^{-5}) and benzo(a)pyrene (1×10^{-5}). Arsenic was not considered significantly greater than background for Site 11; the carcinogenic risk not attributable to arsenic in subsurface soil was 2×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods). Benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene are the only other analytes with carcinogenic risks exceeding the 1×10^{-6} risk level.

The HI from exposure to subsurface soil is 2, which is greater than the risk management HI of 1 for noncarcinogens (see Table F-9.3.8). No individual analytes have a chemical-specific HQ exceeding 1. The HI not attributable to metals present at background concentrations is 1, which is equal to the risk management HI.

7.4.1.4 Soil Evaluation for Site 21

Current Commercial/Industrial Worker

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 1×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.4.1). Most of the carcinogenic risk (1×10^{-5}) is attributable to arsenic, which is the only analyte with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Arsenic was considered significantly greater than background for Site 21, the carcinogenic risk attributable to background levels of arsenic (via the pink background data set) was 3×10^{-6} . The carcinogenic risk not attributable to background levels of arsenic was 1×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 0.3, which is below the risk management HI of 1 for noncarcinogens (see Table F-9.4.1).

Hypothetical Future Construction Worker

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 2×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.4.2). Most of the carcinogenic risk (2×10^{-6}) is attributable to arsenic. Although arsenic was considered significantly greater than background for Site 21, the carcinogenic risk attributable to background levels of arsenic (via the pink background data set) was 3×10^{-7} . The carcinogenic risk not attributable to background levels of arsenic was 1×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 1, which is equal to the risk management HI of 1 for noncarcinogens (see Table F-9.4.2). No individual analytes have a chemical-specific HQ exceeding 1. The HI not attributable to metals present at background concentrations is 0.7, which is below the risk management HI.

Hypothetical Future Resident

Surface Soil (0- to 2-foot bgs depth interval)

The total carcinogenic risk from exposure to surface soil is 1×10^{-4} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Tables F-9.4.3 and F-9.4.4). Most

of the carcinogenic risk (1×10^{-4}) is attributable to arsenic, which is the only analyte with an estimated carcinogenic risk greater than the 1×10^{-6} risk level. Although arsenic was considered significantly greater than background for Site 21, the carcinogenic risk attributable to background levels of arsenic (via the pink background data set) was 1×10^{-5} . The carcinogenic risk not attributable to background levels of arsenic was 4×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to surface soil is 5, which is greater than the risk management HI of 1 for noncarcinogens and is attributable entirely to arsenic, cadmium, and iron (see Table F-9.4.4). Although arsenic and iron were considered significantly greater than background at Site 21, the RME concentrations of arsenic and iron are within the detected concentration of arsenic and iron in the background data set. The noncarcinogenic HI not attributable to arsenic, cadmium, and iron is 0.9, which is less than the risk management HI of 1 for noncarcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

Hypothetical Future Redeveloped Commercial/Industrial Worker

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 4×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.4.5). Most of the carcinogenic risk (4×10^{-6}) is attributable to arsenic. Although arsenic was considered significantly greater than background for Site 21, the carcinogenic risk attributable to background levels of arsenic (via the pink background data set) was 3×10^{-6} . The carcinogenic risk not attributable to background levels of arsenic was 1×10^{-6} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to subsurface soil is 0.2, which is less than the risk management HI of 1 for noncarcinogens (see Table F-9.4.5).

Hypothetical Future Redeveloped Construction Worker

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 5×10^{-7} , which is below the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.4.6). Most of the carcinogenic risk (1.1×10^{-6}) is attributable to arsenic. Although arsenic was considered significantly greater than background for Site 21, the carcinogenic risk attributable to background levels of arsenic (via the pink background data set) was 3×10^{-7} . The carcinogenic risk not attributable to background levels of arsenic was approximately 7×10^{-7} , which is less than the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods).

The HI from exposure to subsurface soil is 0.6, which is below the risk management HI of 1 for noncarcinogens (see Table F-9.4.6).

Hypothetical Future Redeveloped Resident

Subsurface Soil (0- to 8-foot bgs depth interval)

The total carcinogenic risk from exposure to subsurface soil is 4×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Tables F-9.4.7 and F-9.4.8). Most of the carcinogenic risk (3×10^{-5}) is attributable to arsenic. Although arsenic was considered significantly greater than background for Site 21, the carcinogenic risk attributable to background levels of arsenic (via the pink background data set) was 2×10^{-5} . The carcinogenic risk not attributable to background levels of arsenic was approximately 2×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Appendix E of the RI report for a discussion of background comparison methods). Carbazole is the only other COPC exceeding the 1×10^{-6} risk level (1×10^{-6}).

The HI from exposure to subsurface soil is 3, which is greater than the risk management HI of 1 for noncarcinogens (see Table F-9.4.8). No chemical-specific HQ exceeds 1. The HI is attributed primarily to arsenic (0.4), iron (0.8), and manganese (0.3). Arsenic, iron, and manganese are all considered greater than background concentrations.

7.4.2 Groundwater Plume 1

Groundwater from Plume 1 was used to evaluate all of the sites at OU-2B. Since the plume is OU-wide and underlies all the sites, each site was evaluated assuming the same EPCs for groundwater. The results for the individual receptors are discussed below.

Hypothetical Future Resident

As discussed in Section 5.2, groundwater was evaluated for both domestic use and indoor vapor intrusion for the residential receptor. For the residential scenario, carcinogenic risk from domestic use is $8\text{E-}03$, which is above the risk management range. The HI for a child is 300, which is greater than 1. Risk drivers for groundwater for domestic use include the following:

- | | |
|-----------------------|-------------------------|
| • 1,2-DCA | • Chloroform |
| • 1,2-DCE (total) | • Chloromethane |
| • 1,4-Dichlorobenzene | • Chromium (hexavalent) |
| • 1,1,2-TCA | • Manganese |
| • Arsenic | • Methylene Chloride |
| • B(a)P | • PCE |
| • Benzene | • TCE |
| • Benzo(a)anthracene | • Thallium |

- Bromodichloromethane
- Vinyl Chloride

The majority of this risk is associated with domestic use of TCE, which has an individual cancer risk of 7×10^{-3} and a noncancer HQ of 240. Arsenic (4×10^{-4}) and vinyl chloride (3×10^{-4}) also exceed the risk management range (1×10^{-4} risk level). Based on the background comparison, arsenic, manganese, and thallium are attributed to background. The carcinogenic risk from these background metals is $4\text{E-}04$, and the noncancer HI is 40.

The total carcinogenic risk from exposure to groundwater via vapor intrusion is 3×10^{-3} , which exceeds the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.1.3 and F-9.1.4). The HI for a child is 4, which exceeds the risk management HI of 1 for noncarcinogens. Risk drivers for groundwater for the vapor intrusion to indoor air pathway include the following:

- 1,1-DCE
- 1,2-DCA
- Chloroform
- Trichloroethene
- 1,2-DCE
- Benzene
- Tetrachloroethene
- Vinyl Chloride

The majority of this risk is associated with vapor intrusion of TCE, which has an individual cancer risk of 3×10^{-3} , and an individual HQ of 3. No other analytes exceed the risk management range (1×10^{-4} risk level).

Current/Future Commercial/Industrial Worker

Groundwater was not evaluated as a drinking water source for the commercial/industrial worker; vapor intrusion to indoor air was the only complete groundwater pathway for the commercial/industrial worker. The total carcinogenic risk from exposure to groundwater via vapor intrusion is 1×10^{-4} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.1.1). The majority of this risk is associated with exposure to TCE (1×10^{-4}), which is the only analyte exceeding the 1×10^{-6} risk level.

The HI from exposure to groundwater via vapor intrusion is 0.2, which is below the risk management HI of 1 for noncarcinogens (see Table F-9.1.1).

Hypothetical Future Construction Worker

Direct contact with groundwater was not evaluated for the construction worker; vapor emissions from groundwater to outdoor air was the only complete groundwater pathway for the construction worker. The total carcinogenic risk from exposure to groundwater via outdoor air is 6×10^{-5} , which is within the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens (see Table F-9.1.2). The majority of this risk is associated with exposure to 1,4-dichlorobenzene (5×10^{-5}) and TCE (7×10^{-6}), which were the only analytes exceeding the 1×10^{-6} risk level.

The HI from exposure to groundwater via outdoor air is 0.9, which is below the risk management HI of 1 for noncarcinogens (see Table F-9.1.2).

7.4.3 Lead in Soil and Groundwater

7.4.3.1 Lead Evaluation for Site 3

Lead was selected as a COPC for Site 3 soil and groundwater and OU-wide groundwater and was evaluated using LeadSpread. Lead in site soil and groundwater and OU-wide groundwater was not attributed to background. The EPCs for lead are 369 and 180 mg/kg for surface and subsurface soil, respectively. For water ingestion, three EPC s were used: 210 µg/L for the Site 3 lead groundwater plume, 7.38 µg/L for the OU-wide groundwater plume, and 0.15 µg/L for EBMUD drinking water.

For surface soil, the LeadSpread model predicts that the 95th percentile estimate of blood lead is 40.3 µg/dL for a child ingesting Site 3 soil and groundwater from the lead plume, relative to the comparison criterion of 10 µg/dL. The LeadSpread model predicts that the 95th percentile estimate of blood lead is 12.3 µg/dL for a child ingesting Site 3 soil and OU-wide groundwater, and 11.3 µg/dL for a child ingesting Site 3 soil and EBMUD drinking water. These values are elevated when compared to the comparison criterion of 10 µg/dL. Based on LeadSpread results, there is potential risk to human health from ingestion of lead in Site 3 surface soil and groundwater. The 10 µg/dL child blood lead level equates to a soil concentration of 323 mg/kg when EBMUD is the drinking water source.

For subsurface soil, the LeadSpread model predicts that the 95th percentile estimate of blood lead is 35.1 µg/dL for a child ingesting Site 3 soil and groundwater from the lead plume, relative to the comparison criterion of 10 µg/dL. The LeadSpread model predicts that the 95th percentile estimate of blood lead is 7.1 µg/dL for a child ingesting Site 3 soil and OU-wide groundwater, and 6.1 µg/dL for a child ingesting Site 3 soil and EBMUD drinking water. These values are elevated when compared to the comparison criterion of 10 µg/dL. Based on LeadSpread results, there is potential risk to human health from ingestion of lead in Site 3 surface soil and groundwater. The 10 µg/dL child blood lead level equates to a soil concentration of 323 mg/kg when EBMUD is the drinking water source.

7.4.3.2 Lead Evaluation for Site 4

Lead was selected as a COPC for Site 4 soil and OU-wide groundwater and was evaluated using LeadSpread. Lead in site soil and OU-wide groundwater was not attributed to background. The EPCs for lead are 55.9 and 134 mg/kg for surface and subsurface soil, respectively. For water ingestion, two EPC s were used: 7.38 µg/L for the OU-wide groundwater plume, and 0.15 µg/L for EBMUD drinking water.

For surface soil, the LeadSpread model predicts that the 95th percentile estimate of blood lead is 3.7 µg/dL for a child ingesting Site 4 soil and OU-wide groundwater, and 2.7 µg/dL for a child

ingesting Site 4 soil and EBMUD drinking water. These values are below the comparison criterion of 10 µg/dL. Based on LeadSpread results, there is no appreciable risk to human health from ingestion of lead in Site 4 soil and groundwater. The 10 µg/dL child blood lead level equates to a soil concentration of 323 mg/kg when EBMUD is the drinking water source.

For subsurface soil, the LeadSpread model predicts that the 95th percentile estimate of blood lead is 5.8 µg/dL for a child ingesting Site 4 soil and OU-wide groundwater, and 4.8 µg/dL for a child ingesting Site 4 soil and EBMUD drinking water. These values are below the comparison criterion of 10 µg/dL. Based on LeadSpread results, there is no appreciable risk to human health from ingestion of lead in Site 4 soil and groundwater. The 10 µg/dL child blood lead level equates to a soil concentration of 323 mg/kg when EBMUD is the drinking water source.

7.4.3.3 Lead Evaluation for Site 11

Lead was selected as a COPC for Site 11 soil and OU-wide groundwater and was evaluated using LeadSpread. Lead in site soil is attributed to background; lead in OU-wide groundwater is not attributed to background. The EPCs for lead are 70.8 and 29.1 mg/kg for surface and subsurface soil, respectively. For water ingestion, two EPCs were used: 7.38 µg/L for the OU-wide groundwater plume, and 0.15 µg/L for EBMUD drinking water.

For surface soil, the LeadSpread model predicts that the 95th percentile estimate of blood lead is 4.1 µg/dL for a child ingesting Site 11 soil and OU-wide groundwater, and 3.1 µg/dL for a child ingesting Site 11 soil and EBMUD drinking water. These values are below the comparison criterion of 10 µg/dL. Based on LeadSpread results, there is no appreciable risk to human health from ingestion of lead in Site 11 soil and groundwater. The 10 µg/dL child blood lead level equates to a soil concentration of 323 mg/kg when EBMUD is the drinking water source.

For subsurface soil, the LeadSpread model predicts that the 95th percentile estimate of blood lead is 3.0 µg/dL for a child ingesting Site 11 soil and OU-wide groundwater, and 2.0 µg/dL for a child ingesting Site 11 soil and EBMUD drinking water. These values are below the comparison criterion of 10 µg/dL. Based on LeadSpread results, there is no appreciable risk to human health from ingestion of lead in Site 11 soil and groundwater. The 10 µg/dL child blood lead level equates to a soil concentration of 323 mg/kg when EBMUD is the drinking water source.

7.4.3.4 Lead Evaluation for Site 21

Lead was selected as a COPC for Site 21 soil and OU-wide groundwater and was evaluated using LeadSpread. Lead in site soil and OU-wide groundwater is not attributed to background. The EPCs for lead are 37.0 and 132.0 mg/kg for surface and subsurface soil, respectively. For water ingestion, two EPCs were used: 7.38 µg/L for the OU-wide groundwater plume, and 0.15 µg/L for EBMUD drinking water.

For surface soil, the LeadSpread model predicts that the 95th percentile estimate of blood lead is 5.8 µg/dL for a child ingesting Site 21 soil and OU-wide groundwater, and 4.8 µg/dL for a child

ingesting Site 21 soil and EBMUD drinking water. These values are below the comparison criterion of 10 µg/dL. Based on LeadSpread results, there is no appreciable risk to human health from ingestion of lead in Site 21 soil and groundwater. The 10 µg/dL child blood lead level equates to a soil concentration of 323 mg/kg when EBMUD is the drinking water source.

For subsurface soil, the LeadSpread model predicts that the 95th percentile estimate of blood lead is 3.2 µg/dL for a child ingesting Site 21 soil and OU-wide groundwater, and 2.2 µg/dL for a child ingesting Site 11 soil and EBMUD drinking water. These values are below the comparison criterion of 10 µg/dL. Based on LeadSpread results, there is no appreciable risk to human health from ingestion of lead in Site 21 soil and groundwater. The 10 µg/dL child blood lead level equates to a soil concentration of 323 mg/kg when EBMUD is the drinking water source.

8.0 UNCERTAINTY DISCUSSION

Varying degrees of uncertainty exist at each stage of the HHRA. These uncertainties arise from assumptions made in the risk assessment and limitations of the data used to calculate risk estimates. Uncertainty and variability are inherent in the exposure assessment, toxicity values, and risk characterization. EPA guidance (1989) states the following (emphasis from the original):

There are several categories of uncertainties associated with site risk assessments. One is the initial selection of substances used to characterize exposures and risk on the basis of the sampling data and available toxicity information. Other sources of uncertainty are inherent in the toxicity values for each substance used to characterize risk. Additional uncertainties are inherent in the exposure assessment for individual substances and individual exposures. These uncertainties are usually driven by uncertainty in the chemical monitoring data and the models used to estimate exposure concentrations in the absence of monitoring data, but can also be driven by population intake parameters. Finally, additional uncertainties are incorporated in the risk assessment when exposures to several substances across multiple pathways are summed.

EPA defines uncertainty as a “lack of knowledge about specific factors, parameters, or models” including “parameter uncertainty (measurement errors, sampling errors, and systematic errors), model uncertainty (uncertainty associated with necessary simplification of real-world processes, mis-specification of the model structure, model misuse, use of inappropriate surrogate variables), and scenario uncertainty (descriptive errors, aggregation errors, errors in professional judgment, incomplete analysis)” (EPA 1997c). Variability is defined as “observed differences attributable to true heterogeneity or diversity in a population or exposure parameter” (EPA 1997c). Variability is the result of natural random process, such as variations in body weight, breathing rate, or drinking water rates. Although variability cannot be reduced by further study, it may be better characterized by further measurements.

Some sources of uncertainty in the OU-2B HHRA process are described in the following sections.

8.1 UNCERTAINTY IN DATA REDUCTION AND CHEMICALS OF POTENTIAL CONCERN SELECTION PROCESS

For OU-2B, the selection of substances included in the risk assessment was quite conservative. The only chemicals not quantitatively evaluated in the risk assessment were those that are considered essential nutrients. It is unlikely that chemicals eliminated from the risk assessment were either site-related or would have posed a significant health risk. The uncertainty related with this component of the risk assessment is likely to overestimate risk by including chemicals that are not related to site operations. In addition, no decrease in chemical concentrations over time was assumed to occur, which also results in a more conservative risk estimate.

Because some historical PAH data for Alameda Point were observed to have elevated detection limits, historic PAH data were excluded from the RI and HHRA by agency agreement. To address this data loss, additional PAH sampling was conducted at the CERCLA sites during the summer of 2003. Because the 2003 PAH data achieved detection limits that met the DQOs for the RIs (that is, detection limits are less than EPA Region IX PRGs), the HHRA relied on the low-detection limit PAH data, rather than historic data (EPA 2004b). The use of more recent and valid PAH data is not likely to have a significant adverse impact on the calculation of risks for OU-2B. In fact, the more recent data are more likely to accurately represent actual risks at the site. Problems with elevated detection limits could result in (1) chemicals passing the toxicity screen based on detection limits that exceed EPA Region IX PRGs, even if their actual concentrations are less than the PRG and (2) overestimation of risks because the concentrations of nondetected analytes are assumed to be half or a random proxy value of the detection limit.

8.2 UNCERTAINTY IN EXPOSURE ASSESSMENT

Uncertainties were identified in five areas of the exposure assessment process: (1) the selection of exposure scenarios, (2) the selection of exposure pathways, (3) the estimation of EPCs, (4) the use of exposure models, and (5) the selection of exposure variables used to estimate chemical intake. Uncertainties in each of these areas are discussed in Sections 8.2.1 through 8.2.5.

8.2.1 Exposure Scenarios

The exposure assessment relies on current and predicted future use of the land and the parameters that are available to estimate the magnitude and duration of exposures associated with those land uses. In many cases, the land uses are known; however, the range of exposure parameters available may lead to a wide range of risk estimates. In this risk assessment, reuse plans developed by ARRA were used to select future potential receptors. In addition, the sites were evaluated for residential and construction worker scenarios even though these are not the likely planned reuses for these sites. In general, a residential exposure assessment is considered the most conservative assessment because it involves the longest and most extensive contact with environmental media at a site. Inclusion of domestic use of groundwater in the residential exposure increases the conservativeness of this assessment, especially because groundwater is not reasonably expected to serve as a public drinking water supply for the proposed land uses.

8.2.2 Selecting Exposure Pathways

The exposure pathways quantified in this risk assessment were identified on the basis of the area conceptual model, relevant site characterization data, and contaminant fate and transport considerations. To the extent that these factors may not accurately predict the migration of contaminants within and from the area, uncertainty is introduced into the exposure assessment.

8.2.3 Estimating Exposure Point Concentrations

The sample collection strategy was designed whereby samples were collected in areas of suspected or known contamination. The primary objective of this sampling effort was to define the nature and extent of contamination. EPCs based on these nonrandom soil samples are likely to overestimate the concentrations at the exposure point as well as the actual dose to the receptor.

Consistent with EPA and DTSC guidance (EPA 1989; DTSC 1992), if at least 85 percent of values were positive detections, a value of one-half the detection limit or the sample quantitation limit was substituted as a proxy concentration for all laboratory analytical results in which a chemical was not detected. Although sample detection limits for soil are often relatively high because of matrix interference factors, substitution of one-half the detection limit or sample quantitation limit is a standard, widely recognized practice in HHRAs and had no significant effect on the risk assessment results.

The maximum detected concentration was used as the EPC when the estimated UCL_{95} exceeded the maximum detected concentration. The use of the maximum detected concentration tends to overestimate carcinogenic risks and noncarcinogenic hazards because it assumes that a receptor will be exposed to the maximum detected concentration for the entire exposure duration (for example, 25 years for a commercial/industrial worker). This is an unlikely if not impossible exposure scenario. In addition, the maximum detected concentrations for different analytes are often located very far apart (for example, benzene and TCE in groundwater); therefore carcinogenic risks and noncarcinogenic hazards are often overestimated because it is impossible to be exposed to the maxima due to proximity (see the vapor intrusion carcinogenic risks and noncarcinogenic hazards associated with groundwater exposure).

8.2.4 Use of Exposure Models

At least two exposure model considerations were important to understanding the OU-2B HHRA findings: the groundwater-to-indoor-air and soil-to-outdoor-air models. Uncertainties are summarized briefly in the following sections.

8.2.4.1 Uncertainty in Applying the Johnson and Ettinger Model

The federal EPA draft vapor intrusion guidance (2002b) outlined the applicability of the Johnson and Ettinger (1991) model, including important limitations to its application. While controversy still surrounds the use of this model, in 2001 risk managers and the agencies agreed that this

model would be used to assess risk at Alameda Point (Tetra Tech 2001a). The present HHRA submittal assessed the applicability of the Johnson and Ettinger model (which underlies all three of the available tools for the assessment of indoor air risks, including the revised EPA model, the DTSC model, and the CRWQCB model) and found it suitable, with the following caveats:

- The shallowest depth to the water table at OU-2B occurs seasonally and is approximately 5-feet bgs. The typical depth to the water table at OU-2B is 6 to 8 feet bgs, which is deeper than the minimum of 5 feet cited in the draft EPA guidance as the shallowest depth for which the model should be applied (EPA 2002b).
- Soil and groundwater data representing saturated soils and groundwater with product sheen (that is, a nonaqueous layer) were collected and analyzed at OU-2B (see Section 7.2 of the RI report). These data are problematic for risk assessment because they do not represent site-wide baseline conditions but rather represent a hotspot of contamination. However, based upon agreement with the regulatory agencies, these samples were included in the HHRA. Although the presence of product may represent an ongoing source, these product plumes are subject to remediation under the corrective action program. The applicability of the model is supported elsewhere.

With these exceptions, the Johnson and Ettinger model (1991) and its companion EPA draft guidance (EPA 2002b) are reasonably applicable for the Alameda Point OU-2B HHRA.

8.2.4.2 Uncertainty in Particulate Emission Factor and Volatilization Factor Approach

The default PEF recommended by EPA Region IX is based on bare, unvegetated soil and may therefore overestimate COPC concentrations in outdoor air for sites where soil is or will be covered by lawns or other vegetative ground cover. Vegetation generally reduces the amount of dust and suspended particulate matter released from the underlying soil.

8.2.5 Selecting Exposure Variables

The exposure variables used to estimate chemical intake are standard upperbound estimates. In reality, however, there may be considerable variation in the activity patterns and physiological response of individuals. It is possible that the exposure variables used in this evaluation do not represent actual future exposure conditions.

At the same time, the exposure parameters used in the HHRA for the Alameda OU-2B sites were standard default exposure parameters for workers and residents; the only receptor class requiring professional judgment was the construction worker. Because defaults assumptions generally were used, this HHRA is expected to be comparable to others conducted within EPA Region IX and California. All defaults are expected to err on the conservative side rather than underpredicting unforeseen human health risks.

Variability in exposure duration and frequency as well as breathing rates, soil ingestion rates, and amount of dermal contact with soil can be substantial. In this risk assessment, RMEs were characterized for each receptor, which leads to a compounding of conservative assumptions that likely overestimates risk. The default RME parameters are selected to be representative of the 95th percentile of exposure or higher for each exposure pathway, but they do not necessarily denote likely exposure. For example, it is unlikely that there could be concurrent exposure to vapors from vapor intrusion to indoor air and particulates from surface soil; both exposures assume that the inhalation rate is 20 m³/day, so summing the two exposure pathways is equivalent to breathing 40 m³/day. Because inhalation RfCs and unit rate factors (URF) are based on an inhalation rate of 20 m³/day, summing the risks from vapor intrusion to indoor air and particulates from surface soil will overestimate risks. In addition, the RME exposure parameters are based on exposures that are not likely to occur; for example, a person is assumed to be exposed to COPCs at the site for 24 hours per day, 350 days per year for 30 years. Risks calculated for the CTE scenario (presented in Attachment F2 for comparative purposes) represent the average or median exposures for each scenario. These values, particularly for exposure frequency and duration, may be more representative of expected exposures. Many different combinations of exposure parameters will result in risk estimates between the RME and CTE risks presented here.

8.3 UNCERTAINTY IN TOXICITY ASSESSMENT

The primary uncertainties associated with the toxicity assessment are related to derivation of toxicity values for COPCs. Standard RfDs and SFs developed by EPA were used to estimate potential cancer and noncancer health effects from exposure to COPCs at the site. These values are derived by applying conservative (health-protective) assumptions and are intended to protect the most sensitive potentially exposed individuals.

To derive the toxicity values, EPA makes several assumptions that tend to overestimate the actual hazard or risk to human health. Because data from human studies are generally unavailable, RfDs are typically derived from animal studies and are adjusted with uncertainty factors and modifying factors to ensure adequate protection of human health. For many compounds, this approach may overestimate potential noncancer adverse health effects.

Derivation of SFs used to estimate cancer risk is also typically based on data from animal studies. These data are taken from studies in which high doses of a test chemical were administered to laboratory animals, and the reported response is extrapolated to the much lower doses that humans are likely to encounter. Very little experimental data are available on the nature of the dose-response relationship at low doses (for example, a threshold may exist or the dose-response curve may pass through the origin, indicating there is the potential for responses at very low levels). Because of this uncertainty, EPA has selected a conservative model to estimate the low-dose relationship. The EPA model uses an upperbound estimate (typically the UCL₉₅ of the slope predicted by the extrapolation model) as the SF. With this SF, an upperbound estimate of potential cancer risks is obtained.

A second uncertainty associated with toxicity values is the lack of RfDs or SFs for all COPCs at a site. The cancer risks and noncancer health hazards can be assessed only for those COPCs for which relevant toxicity values are available. For organic COPCs where the SF or RfD was available for only one route of exposure, route-to-route extrapolations were made. These extrapolations introduce some uncertainty into the risk and hazard estimates. Further, the use of oral toxicity values to assess the dermal pathway introduces additional uncertainty into the results; risks may be overestimated or underestimated using this approach. In addition, risks may be underestimated for exposure to the PAH COPCs, which are based on toxicity equivalency factors of 10 higher or lower than a baseline RfD for a surrogate PAH.

In addition to the uncertainties associated with derivation and availability of toxicity values, the toxicity assessment is affected by chemical-specific factors, as described in the following subsections.

8.3.1 Chromium Speciation

To evaluate potential impacts to human health risk at OU-2B from the different forms of chromium, approximately 34 soil samples were collected and analyzed for both total chromium and hexavalent chromium. The maximum total chromium concentration was 1,530 mg/kg and the maximum hexavalent chromium concentration was 7.8 mg/kg. Hexavalent chromium levels may be more than 200 times lower than total chromium at OU-2B. Based on these analyses, soil chromium at OU-2B was evaluated as trivalent chromium. Since hexavalent chromium is not a carcinogen by the oral route, evaluating chromium as trivalent chromium is not likely to have as significant impact on the risk assessment results. Further, when forward risk was calculated using trivalent chromium toxicity values, it was appropriately based on the general absence of hexavalent chromium in OU-2B soils.

8.3.2 Surrogates for Total Petroleum Hydrocarbons

BTEX compounds were quantified independently as surrogates to assess potential risk and hazards associated with TPH. The assessment of TPH was thus dependent upon the adequacy of the BTEX analytical data. Most samples were analyzed for BTEX, and the analytical results are expected to adequately represent the health risks associated with potential exposure to TPH as gasoline. The magnitude of the uncertainties in the TPH assessment was assumed to be a function of the spatial distribution of TPH as diesel and motor oil contamination relative to the distribution of the samples analyzed for BTEX.

Further, the assessment of the target compounds adequately describes human health risks at Superfund sites (DTSC 1993a). This approach is not likely to significantly underestimate human health risks.

8.3.3 Arsenic Toxicity

Much of the uncertainty surrounding the arsenic PRGs relates to the underlying toxicity studies (EPA 2004b). The adverse health effects produced by arsenic are highly dose-dependent. For example, at low concentrations, arsenic may be an essential nutrient and substitute for phosphorus in key biochemical reactions (Agency for Toxic Substances and Disease Registry [ATSDR] 2000). At toxic levels, arsenic produces a severe form of peripheral arteriosclerosis known as blackfoot disease; the prominent pathological effect of chronic exposure to arsenic is plantar and palmar hyperpigmentation and hyperkeratotic lesions (ATSDR 2000).

The largest controversy surrounding arsenic is whether the cancer-based PRG is realistic, given the extrapolations inherent in the PRG process as well as the uncertainty of applying a SF that was derived for media other than soil (that is, air and water). The uncertainties associated with the ingestion of inorganic arsenic are such that estimated cancer-based PRGs for arsenic are overly conservative and could be modified upwards as much as 1 order of magnitude relative to risk estimates associated with most other carcinogens. EPA has recognized this in the past and has allowed management and screening of arsenic cancer risks at the 1×10^{-5} risk level or higher, as long as noncancer effects of chronic arsenic exposure are also considered.

Studies have also shown that arsenic in soil is likely to be absorbed to a lesser degree than arsenic in solution (ATSDR 2000). Because the oral SF for arsenic was based on ingestion of arsenic in solution, its use is likely to overestimate the carcinogenicity of soil-bound arsenic. In fact, bioavailability of arsenic has reportedly ranged from 20 percent in monkeys (Freeman and others 1994) to 78 percent in swine (Lorenzana 1995). A relative bioavailability factor of 78 percent was adopted by Texas in its development of PRG-like, risk-based, protective concentration levels. If bioavailability were taken into account, cancer-based PRGs for arsenic could be increased by as much as 80 percent. While arsenic is a class A, known human carcinogen based on sufficient evidence of observed increased lung and skin cancer in human populations (EPA 2005a), uncertainty surrounds the use of the derived SFs in assessing risks from soil.

8.3.4 Use of Federal Toxicity Criteria Instead of California Values

As introduced in Section 6.6, to provide for a conservative estimate of potential risk, DTSC advocates use of state of California toxicity values. For consistency with Navy risk assessment guidance and EPA guidance (2004b), DTSC Office of Environmental Health Hazard Assessment (OEHHA) toxicity values must be considered only for a limited number of chemicals, such as those associated with Cal-modified PRGs that were developed by EPA Region IX. This focuses attention on those chemicals that are associated with state toxicity values that are significantly more protective than the EPA-recommended toxicity values, as determined by EPA Region IX. Cal-modified PRGs (other than for lead) are available for only six other compounds (1,1-dichloroethene [1,1-DCE]; arsenic; chloroform; benzo[k]fluoranthene [BKF]; chrysene; and naphthalene), as reflected in the latest EPA Region IX PRG table (EPA 2004b). A small subset of these were detected or selected as COPCs for specific sites, as detailed in Section 8.3.4.1.

In addition, Section 8.3.4.2 provides chemical-specific examples of the rationale for using federal EPA potency values for other COPCs at OU-2B for which the OEHHA cancer potency values is 4 times more conservative than the federal EPA value (see Section 8.3.5.2). The Navy (2002) has noted that “it is unclear the extent of peer review conducted for the California toxicity values.” In contrast, the federal EPA values are generally more rigorously reviewed. The conclusions relative to the OU-2B risk characterization are presented in Section 8.3.5.3.

8.3.4.1 Impact on Risk Characterization from Chemicals of Potential Concern with Cal-Modified Preliminary Remediation Goals

The following OU-2B COPCs are chemicals with a Cal-modified PRG (indicating that DTSC and EPA Region IX have agreed that their toxicity evaluations are significantly different):

- Site 3 surface and subsurface soil included the COPCs arsenic, BKF, chrysene, and naphthalene (see Tables F-3.1 and F-3.2)
- Site 4 surface and subsurface soil included the COPCs 1,1-DCA, arsenic, BKF, chrysene, and naphthalene (see Tables F-3.3 and F-3.4)
- Site 11 surface and subsurface soil included the COPCs arsenic, chloroform, BKF, chrysene, and naphthalene (see Tables F-3.5 and F-3.6)
- Site 21 surface and subsurface soil included the COPCs arsenic, chloroform, BKF, chrysene, and naphthalene (see Tables F-3.7 and F-3.8)
- Groundwater Plume 1 included the COPCs 1,1-DCA, arsenic, chloroform, and naphthalene (see Table F-3.9)

Groundwater Plume 2 did not have any COPCs other than lead that were significantly different (see Table F-3.19).

Based on the toxicity value hierarchy used in the toxicity assessment (Section 6.0), the DTSC cancer slope factors for 1,1-DCA and naphthalene were used in the HHRA for OU-2B. Accordingly, these chemicals will not be evaluated in the discussion below. The impacts to risk conclusions for OU-2B for the remaining chemicals with Cal-modified PRGs are presented in the following text.

Site 3

Arsenic, BKF and chrysene were COPCs in surface and subsurface soil at Site 3 (Tables F-3.1 and F-3.2). Arsenic is a risk driver for both surface and subsurface soil at Site 3; BKF and chrysene were not risk drivers. Using the DTSC-recommended OEHHA toxicity values for these COPCs does not change the risk conclusions for Site 3 soil.

For the hypothetical residential redevelopment exposure to arsenic (0- to 8-foot bgs depth interval), the arsenic risk of 1×10^{-4} increases to 7×10^{-4} using the OEHHA oral SF of 9.5 per mg/kg-day rather than the EPA value of 1.5 per mg/kg-day. While the arsenic risk increases from within the risk management range to above the risk management range, arsenic is considered background at Site 3.

For the hypothetical residential redevelopment exposure to BKF (0- to 8-foot bgs depth interval), the BKF risk of 6×10^{-8} increases to 1×10^{-6} using the OEHHA oral SF of 1.2 per mg/kg-day rather than the EPA value of 0.073 per mg/kg-day. The resulting risk of 1×10^{-6} is within the risk management range.

For the hypothetical residential redevelopment exposure to chrysene (0- to 8-foot bgs depth interval), the chrysene risk of 2×10^{-8} increases to 2×10^{-7} using the OEHHA oral SF of 0.12 per mg/kg-day rather than the EPA value of 0.0073 per mg/kg-day. The resulting risk is still below the risk management range, so chrysene is not a risk driver.

Although the overall risk for the residential receptor would exceed the risk management range using OEHHA toxicity values (to 8×10^{-4}), most of the risk is attributed to arsenic, which is considered background at Site 3. Use of the OEHHA toxicity factors would not change the risk characterization for Site 3 soil.

Site 4

Arsenic, BKF, and chrysene were COPCs in surface and subsurface soil at Site 4 (see Tables F-3.3 and F-3.4). Arsenic is a risk driver for both surface and subsurface soils, BKF and chrysene were not risk drivers. Using the DTSC-recommended OEHHA toxicity value for these COPCs does not change the risk conclusions for Site 4 soil.

For the hypothetical residential redevelopment exposure to arsenic (0- to 8-foot bgs depth interval), the total chemical risk of 3×10^{-5} increases to 2×10^{-4} using the OEHHA oral SF of 9.5 per mg/kg-day rather than the EPA value of 1.5 per mg/kg-day. While the arsenic risk increases from within the risk management range to above the risk management range, arsenic is considered background at Site 4.

For the hypothetical residential redevelopment exposure to BKF (0- to 8-foot bgs depth interval), the BKF risk of 2×10^{-8} increases to 2×10^{-7} using the OEHHA oral SF of 1.2 per mg/kg-day rather than the EPA value of 0.073 per mg/kg-day. The resulting risk is still below the risk management range, so BKF is not a risk driver.

For the hypothetical residential redevelopment exposure to chrysene (0- to 8-foot bgs depth interval), the chrysene risk of 3×10^{-9} increases to 5×10^{-8} using the OEHHA oral SF of 0.12 per mg/kg-day rather than the EPA value of 0.0073 per mg/kg-day. The resulting risk is still below the risk management range, so chrysene is not a risk driver.

Although the overall risk for the residential receptor would exceed the risk management range using OEHHA toxicity values (to 3×10^{-4}), most of the risk is attributed to arsenic, which is considered background at Site 4. Use of the OEHHA toxicity factors would not change the risk characterization for Site 4 soil.

Site 11

Arsenic, BKF, chloroform, and chrysene were COPCs in surface and subsurface soil at Site 11 (see Tables F-3.5 and F-3.6). Arsenic was a risk driver for both surface and subsurface soils; BKF, chloroform, and chrysene were not risk drivers. Using the DTSC-recommended OEHHA toxicity value for these COPCs does not change the risk conclusions for Site 11 soil.

For the hypothetical residential redevelopment exposure to arsenic (0- to 8-foot bgs depth interval), the total chemical risk of 1×10^{-5} increases to 9×10^{-5} using the OEHHA oral SF of 9.5 per mg/kg-day rather than the EPA value of 1.5 per mg/kg-day. The resulting risk is still within the risk management range. Arsenic is considered background at Site 11.

For the hypothetical residential redevelopment exposure to BKF (0- to 8-foot bgs depth interval), the BKF risk of 6×10^{-8} increases to 9×10^{-7} using the OEHHA oral SF of 1.2 per mg/kg-day rather than the EPA value of 0.073 per mg/kg-day. The resulting risk is still below the risk management range, so BKF is not a risk driver.

For the hypothetical residential redevelopment exposure to chloroform (0- to 8-foot bgs depth interval), the chloroform risk of 9×10^{-9} does not change using the OEHHA oral SF of 0.031 per mg/kg-day; EPA does not have an oral SF for chloroform. The resulting risk is still below the risk management range, so chloroform is not a risk driver.

For the hypothetical residential redevelopment exposure to chrysene (0- to 8-foot bgs depth interval), the chrysene risk of 2×10^{-8} increases to 4×10^{-7} using the OEHHA oral SF of 0.12 per mg/kg-day rather than the EPA value of 0.0073 per mg/kg-day. The resulting risk is still below the risk management range, so chrysene is not a risk driver.

Soil risks for hypothetical future receptors were already in the risk management range at 4×10^{-5} . Using OEHHA toxicity values, the cancer risk is 1×10^{-4} , which is within the risk management range. Use of the OEHHA toxicity factors would not change the risk characterization for Site 11 soil.

Site 21

Arsenic, BKF, chloroform, and chrysene were COPCs in surface and subsurface soil at Site 21 (see Tables F-3.7 and F-3.8). Arsenic was a risk driver for both surface and subsurface soils; BKF, chloroform, and chrysene were not risk drivers. Using the DTSC-recommended OEHHA toxicity value for these COPCs does not change the risk conclusions for Site 21 soil.

For the hypothetical residential redevelopment exposure to arsenic (0- to 8-foot bgs depth interval), the total chemical risk of 3×10^{-5} increases to 2×10^{-4} using the OEHHA oral SF of 9.5 per mg/kg-day rather than the EPA value of 1.5 per mg/kg-day. The resulting risk exceeds the risk management range. Arsenic is considered background at Site 21.

For the hypothetical residential redevelopment exposure to BKF (0- to 8-foot bgs depth interval), the BKF risk of 3×10^{-9} increases to 4×10^{-8} using the OEHHA oral SF of 1.2 per mg/kg-day rather than the EPA value of 0.073 per mg/kg-day. The resulting risk is still below the risk management range, so BKF is not a risk driver.

For the hypothetical residential redevelopment exposure to chloroform (0- to 8-foot bgs depth interval), the chloroform risk of 2×10^{-8} does not change using the OEHHA oral SF of 0.031 per mg/kg-day; EPA does not have an oral SF for chloroform. The resulting risk is still below the risk management range, so chloroform is not a risk driver.

For the hypothetical residential redevelopment exposure to chrysene (0- to 8-foot bgs depth interval), the chrysene risk of 4×10^{-10} increases to 6×10^{-9} using the OEHHA oral SF of 0.12 per mg/kg-day rather than the EPA value of 0.0073 per mg/kg-day. The resulting risk is still below the risk management range, so chrysene is not a risk driver.

The overall risk for the residential receptor would exceed the risk management range using OEHHA toxicity values (to 2×10^{-4}). Arsenic is considered to exceed background at Site 21.

Plume 1 Groundwater

Both chloroform and arsenic were COPCs and risk drivers in Plume 1 groundwater (see Table F-3.9).

For arsenic, the risk using groundwater for domestic use of 4×10^{-4} increases to 3×10^{-3} using the OEHHA oral SF of 9.5 per mg/kg-day rather than the EPA value of 1.5 per mg/kg-day. The resulting risk still exceeds the risk management range. Arsenic is considered background in Plume 1 groundwater. For chloroform, the risk from domestic use and vapor intrusion increases from 4×10^{-6} to 8×10^{-6} using the OEHHA oral SF of 0.031 per mg/kg-day; EPA does not have an oral SF for chloroform. The resulting risk is still within the risk management range.

Even using the OEHHA oral slope factors for arsenic and chloroform, the risks from whole house use of groundwater and vapor intrusion remains 1×10^{-2} for the residential receptor, which exceeds the risk management range of 1×10^{-4} to 1×10^{-6} for carcinogens. Accordingly, use of OEHHA toxicity factors would not change the risk characterization for Plume 1 groundwater.

8.3.4.2 Other COPCs with Significant Different State and Federal Toxicity Values

This section presents chemical-specific examples for benzene and vinyl chloride, including (a) the difference between the federal EPA toxicity value and the OEHHA value; (b) the implication of using the EPA toxicity value (that is, the magnitude); and (c) recommendation for the best, scientifically valid, peer-reviewed, and appropriate toxicity value. EPA IRIS information was reviewed on April 5, 2005 (EPA 2005a).

Benzene

EPA sponsored an extremely in-depth, comprehensive, updated toxicological review of benzene by experts in the subject with extensive peer reviews; the study was completed in 1998 and was based on literature through 1997. The California OEHHA values are based on data from a Proposition 65-based weighted cumulative exposure/relative risk procedure from 1988 (OEHHA 2002); the OEHHA values predated the EPA review by 10 years. The California OEHHA values also incorporated animal data to develop the human cancer potency value, while the federal EPA values used human inhalation data related to leukemia incidences that were available and suitable. EPA Region IX has not developed a Cal-modified PRG (EPA 2004b) based on the OEHHA values, possibly because of these weaknesses underlying the OEHHA value and the more recent federal assessment, despite the fact that it is more than 4 times more conservative. EPA values were subject to rigorous peer review process that is well documented and publicly available. The details of the OEHHA peer review, however, are not publicly available. For these reasons, the federal EPA value (rather than the California OEHHA value) was used in the Alameda OU-2B HHRA.

Vinyl Chloride

EPA also sponsored an extremely in-depth, comprehensive updated toxicological review of vinyl chloride (with two external peer reviews); the review was completed in 2000. The California OEHHA values predated the EPA review and relied on a more basic model and simple scaling to develop the cancer potency value. EPA used a physiologically based pharmacokinetic (PBPK) model, which is more sophisticated than the default conversion used by California OEHHA. EPA Region IX has not developed a California PRG based on the OEHHA values (EPA 2004b), possibly because of the weaknesses underlying the OEHHA value, despite the fact that it is nearly 9 times more conservative. EPA values were peer reviewed by an internal EPA expert panel and were subjected to two external scientific peer reviews. The results of the external peer review are publicly available on IRIS (EPA 2005a), while no peer review details are publicly available for the OEHHA values. For these reasons, the EPA value (rather than the California OEHHA value) was used in the Alameda OU-2B HHRA.

8.3.4.3 Conclusions on Use of State versus Federal Toxicity Values

Section 8.3.5.1 indicated that there would be no change to the risk characterization for any site if California toxicity values were used in cases where EPA Region IX developed a Cal-modified PRG to acknowledge the significant difference between federal and state toxicity values (EPA 2004b).

For benzene and vinyl chloride (see Section 8.3.4.2), where a potentially significant mathematical difference exists, the federal toxicity values have been found to be more current and scientifically robust.

For these reasons, the Alameda Point OU-2B HHRA would not benefit from a separate assessment of the state toxicity values, as the conclusions of the risk characterization would not change. In particular, because much of OU-2B is proceeding to the FS stage (see Section 10 of the RI report), impacts to risk management conclusions would be insignificant if a separate assessment were conducted solely with California-recommended toxicity values.

8.3.5 Route-to-Route Extrapolation

Route-to-route extrapolation was employed for some OU-2B COPCs that currently lack toxicity factors. Inhalation toxicity factors for several VOCs were route-extrapolated from oral toxicity factors; this approach presupposes that inhalation of these chemicals is as hazardous as ingestion and that the effects would be exerted in the same manner. For this HHRA, toxicity values were used to assess risks from dermal exposure without adjusting for gastrointestinal absorption efficiency. This approach may underestimate risk, the magnitude of which is inversely proportional to the gastrointestinal absorption of the chemical. In reality, the route of exposure can result in different effects or differing degrees of effect; therefore, the uncertainty associated with the use of route-to-route extrapolation may over- or underestimate risk to an undetermined degree.

8.3.6 Chemicals Lacking Toxicity Criteria

Because toxicity values have not been developed for all chemicals, risks or HIs may be underestimated. Toxicity values may not be available for a variety of reasons: (1) a chemical may not have been studied, (2) studies may have been inconclusive, or (3) the chemical may have been studied only as part of a mixture, and no chemical-specific information was generated. In each case, the lack of a toxicity value is likely to underestimate risk. The magnitude of the underestimation is not known because a lack of a toxicity value indicates the lack of any reliable toxicity information.

8.3.7 Manganese Toxicity Criteria

The EPA Region IX manganese RfD of 0.024 mg/kg-day includes nonstandard methodology that is inconsistent with the following: (1) IRIS (EPA 2005a), (2) the treatment of other essential

nutrients in Superfund risk assessment, and (3) other EPA regional approaches. On the October 1, 2002, EPA Region IX PRG table (EPA 2004b), manganese is flagged as "Non-Standard Method Applied" (see Section 2.3 of the "EPA Region IX PRGs Table User's Guide"), with the following accompanying text:

The IRIS RfD (0.14 mg/kg-day) includes manganese from all sources, including diet. The author of the IRIS assessment for manganese recommends that the dietary contribution from the normal U.S. diet (an upper limit of 5 mg/day) be subtracted when evaluating non-food (e.g. drinking water or soil) exposures to manganese, leading to a RfD of 0.071 mg/kg-day for non-food items. The explanatory text in IRIS further recommends using a modifying factor of 3 when calculating risks associated with non-food sources due to a number of uncertainties that are discussed in the IRIS file for manganese, leading to a RfD of 0.024 mg/kg-day. This modified RfD is applied in the derivation of the EPA Region IX PRGs for soil and water.

Although the IRIS file does not dictate that the dietary contribution be subtracted from the total "safe" dose before the conversion of the modifying factor of 3, EPA Region IX interpreted the order of operations as such. In the case of manganese, EPA Region IX has chosen to convert the RfD in a chemical-specific way that is not employed for any other essential nutrient. All essential elements have a dietary component by definition, but no other elemental reference doses are lowered by subtracting the dietary contribution before applying modifying factors. This approach to the manganese RfD was first disclosed in detail in the latest "EPA Region IX PRGs Table User's Guide" (October 1, 2002). Other EPA regions (including Region VI, as of November 26, 2002) have interpreted the IRIS file differently and have applied the modifying factor of 3 to the full oral RfD of 0.14 mg/kg-day without first subtracting dietary exposure. This alternative approach to determining the PRG would decrease the noncancer hazards reported for manganese throughout the OU-2B HHRA.

8.3.8 Trichloroethene Toxicity

The estimation of human health effects associated with exposures to TCE is clouded by controversy regarding the appropriateness of existing toxicity criteria for all receptors. The toxicity of TCE has been under review and evaluation by EPA with respect to potential cancer and noncancer effect levels, but no values have been finalized as of 2003. The EPA IRIS database (EPA 2005a) currently does not recommend any specific values to quantify risks associated with TCE exposure. The lack of toxicity guidance is problematic for risk assessors because TCE is associated with several adverse health effects, including neurotoxicity, immunotoxicity, developmental toxicity, liver toxicity, kidney toxicity, endocrine effects, and several forms of cancer (NCEA 2001). Metabolic studies indicate that exposure to TCE results in internal exposure to a complex mixture of TCE metabolites (such as trichloroacetic acid and dichloroacetic acid), which may be responsible for much of the toxicity associated with TCE. In some assays, TCE has been shown to be inactive in the absence of its metabolites (NCEA 2001). Evidence suggests that some subpopulations may be more sensitive to the toxic effects of TCE than others and that TCE could affect children and adults differently. TCE exposure may also increase the toxicity of other chemicals, but methods to quantify this relationship have not been

established by the regulatory community; as a result, qualitative consideration of the cumulative effect of TCE in the presence of other environmental contaminants is important.

NCEA has endorsed the use of provisional values for health effects associated with TCE exposure that were derived using PBPK methods and route extrapolation (NCEA 2001). For effects other than cancer, NCEA recommends (1) an oral RfD of 3×10^{-4} mg/kg-day based on critical effects to the liver, kidney, and developing fetus, and (2) an inhalation RfC of 4×10^{-2} mg/m³, based on critical effects to the central nervous system, liver, and endocrine system observed in subchronic studies in mice and rats at doses as low as 1 mg/kg-day. The primary source of uncertainty associated with the TCE toxicity factors is the use of subchronic exposure data to represent chronic exposure.

NCEA has recommended several SFs for TCE, with most between 2×10^{-2} and 4×10^{-1} per mg/kg-day. The range of SFs has not been reduced to a single number, but NCEA recommends that risk assessors use the upper end of the SF range to emphasize the possibility that different risks may exist under different circumstances. The use of the upper end of the range of SFs is conservative and should not result underestimate risks associated with exposures to TCE.

8.3.9 Use of *cis*-1,2-Dichloroethene as Surrogate for Toxicity of Total 1,2-Dichloroethene Mixture

During some sampling events at Alameda Point, analytical results (particularly historical results) did not differentiate between the *cis*- and *trans*- isomers of 1,2-DCE, instead reporting 1,2-DCE concentrations as "total 1,2-DCA." Because the toxicities of the *cis*- and *trans*- isomers of 1,2-DCE differ, this HHRA conservatively assumes that all total 1,2-DCE consisted of the more toxic *cis*-1,2-DCE isomer. All toxicity factors for 1,2-DCE, including PRGs, RfDs, and RfCs, were based on the *cis*-DCE isomer and were assumed to represent the toxicity of the total 1,2-DCE mixture. This assumption is conservative and would overestimate risk because the inhalation RfD (based on route-to-route extrapolation for both chemicals) for *cis*-1,2-DCE (0.01 mg/kg-day from HEAST [EPA 1997a]) is 50 percent lower and more protective than that of the *trans*-isomer (0.02 mg/kg-day [EPA 2005a]).

8.4 UNCERTAINTIES IN RISK CHARACTERIZATION

Standard EPA methodologies were used for the risk characterization step. Uncertainty arises in the assumption of additivity and the presentation of point estimates rather than risk ranges. Uncertainties may also be sensitive to COPC selection when considering total risk.

8.4.1 Additivity Assumption in Risk Characterization

Standard methodologies estimate the total cancer risk associated with a site by adding the exposure risks for multiple carcinogens.. According to EPA guidance (EPA 1989),

“uncertainties associated with summing risks or hazard indices for several substances are of particular concern in the risk characterization step. The assumption of dose additivity ignores possible synergisms or antagonisms among chemicals, and assumes similarity in mechanisms of action and metabolism. Unfortunately, data to assess interactions quantitatively are lacking.”

Despite these concerns, EPA guidance recommends summing the risks and HIs to avoid underestimating cancer risk or potential noncarcinogenic health effects at a site. Summing the risks and HIs may overestimate results because mechanisms of action and metabolism are assumed to be similar and potential antagonistic effects are ignored. It is also possible that total risks and HIs may be underestimated because potential synergistic effects are ignored.

8.4.2 Presentation of Point Estimates in Risk Characterization

Overall, RME risks and HIs presented in this HHRA for each site are conservative estimates and are more likely to be overestimated than underestimated. The estimates presented here are single-point estimates rather than a range of values. Rarely do single-point estimates accurately represent actual exposures, however. In addition, information on variability of exposure (the variance of the mathematical distribution) is not retained in a single-point estimate. As stated in DTSC guidance, “Uncertainty and variability in the movement of the chemical across the environment as well as the nature of the potential human exposures mean that the risk is more accurately characterized by a range or distribution” (DTSC 1995). When decisions are made based on risk estimates, the range of risks should be considered. Several of the toxicity values (such as those for benzene and TCE) are also ranges of values (rather than point estimates); the resulting risk predicted can also be a range of values, sometimes spanning an order of magnitude. This information is lost when the highest, most conservative risk is determined using the most conservative value in the toxicity range.

8.5 UNCERTAINTY SUMMARY

This HHRA was developed based on a series of assumptions. Almost all of these assumptions are very conservative and are expected to overestimate risks. Even considering the uncertainties that may slightly underestimate risk, the compounding conservatism in the HHRA process is expected to negate those assumptions and avoid any calculated underestimation of risks.

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